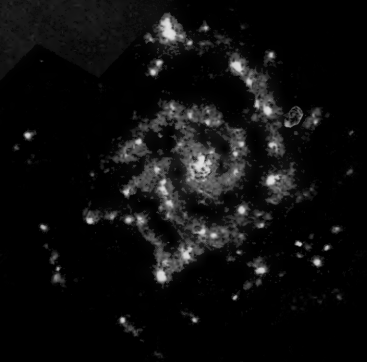
Scientific and Technical Aerospace Reports

STAR



An Abstract Journal

Volume 30, Number 3
February 8, 1992
N92-11966 to N92-12987

Scientific and Technical Aerospace Reports

Scientific and Technical Aerospace Reports (STAR) is an abstract journal that provides comprehensive coverage of worldwide aerospace-related reports. It is a major product of the International Aerospace Database managed by the NASA Scientific and Technical Information (STI) Program. The coverage includes reports on aeronautics, space, and supporting disciplines. *STAR* lists current, publicly available reports entered into the NASA STI Database during the 2-week period preceding publication. A typical citation and abstract appear on page viii. They explain how to read the items that are announced in this journal.

NASA sponsors a companion journal, *International Aerospace Abstracts (IAA)* (*NOVA* for internal NASA use) that lists abstracts of the open literature on aerospace subjects available worldwide. *IAA* is available for sale through the AIAA.

Entries found in *STAR* and *IAA* are available through NASA's online service, RECON, as the International Aerospace Database and through DIALOG as the Aerospace Database.

Information on aerospace and related subjects is gathered by the NASA STI Program through national and international agreements and exchanges and is made available to the NASA community as well as to the public in many forms through various outlets. The section on NASA STI Program Products and Services contains additional information.

For further information please contact:
NASA Center for AeroSpace Information (CASI)
P.O. Box 8757
Baltimore, Maryland 21240-0757
(301) 621-0390

US ISSN 0036-8741

Volume 30 Number 3 / February 8, 1992

TABLE OF CONTENTS

AERONAUTICS For related information see also *Astronautics.*

01 AERONAUTICS (GENERAL) ..... **N.A.**

02 AERODYNAMICS **347**
Includes aerodynamics of bodies, combinations, wings, rotors, and control surfaces; and internal flow in ducts and turbomachinery. For related information see also *34 Fluid Mechanics and Heat Transfer.*

03 AIR TRANSPORTATION AND SAFETY **350**
Includes passenger and cargo air transport operations; and aircraft accidents. For related information see also *16 Space Transportation* and *85 Urban Technology and Transportation.*

04 AIRCRAFT COMMUNICATIONS AND NAVIGATION **350**
Includes digital and voice communication with aircraft; air navigation systems (satellite and ground based); and air traffic control. For related information see also *17 Space Communications, Spacecraft Communications, Command and Tracking* and *32 Communications and Radar.*

05 AIRCRAFT DESIGN, TESTING AND PERFORMANCE **351**
Includes aircraft simulation technology. For related information see also *18 Spacecraft Design, Testing and Performance* and *39 Structural Mechanics.* For land transportation vehicles see *85 Urban Technology and Transportation.*

06 AIRCRAFT INSTRUMENTATION **352**
Includes cockpit and cabin display devices; and flight instruments. For related information see also *19 Space craft Instrumentation* and *35 Instrumentation and Photography.*

07 AIRCRAFT PROPULSION AND POWER **353**
Includes prime propulsion systems and systems components, e.g., gas turbine engines and compressors; and onboard auxiliary power plants for aircraft. For related information see also *20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *44 Energy Production and Conversion.*

08 AIRCRAFT STABILITY AND CONTROL **354**
Includes aircraft handling qualities; piloting; flight controls; and autopilots. For related information see also *05 Aircraft Design, Testing and Performance.*

09 RESEARCH AND SUPPORT FACILITIES (AIR) **355**
Includes airports, hangars and runways; aircraft repair and overhaul facilities; wind tunnels; shock tubes; and aircraft engine test stands. For related information see also *14 Ground Support Systems and Facilities (Space).*

ASTRONAUTICS For related information see also *Aeronautics.*

12 ASTRONAUTICS (GENERAL) **355**
For extraterrestrial exploration see *91 Lunar and Planetary Exploration.*

13 ASTRODYNAMICS ..... **N.A.**
Includes powered and free-flight trajectories; and orbital and launching dynamics.

14 GROUND SUPPORT SYSTEMS AND FACILITIES (SPACE) **356**
Includes launch complexes, research and production facilities; ground support equipment, e.g., mobile transporters; and simulators. For related information see also *09 Research and Support Facilities (Air).*

15 LAUNCH VEHICLES AND SPACE VEHICLES **359**
Includes boosters; operating problems of launch/space vehicle systems; and reusable vehicles. For related information see also *20 Spacecraft Propulsion and Power.*

16 SPACE TRANSPORTATION ..... **N.A.**
Includes passenger and cargo space transportation, e.g., shuttle operations; and space rescue techniques. For related information see also *03 Air Transportation and Safety* and *18 Spacecraft Design, Testing and Performance.* For space suits see *54 Man/System Technology and Life Support.*

17 SPACE COMMUNICATIONS, SPACECRAFT COMMUNICATIONS, COMMAND AND TRACKING . **359**
Includes telemetry; space communications networks; astronavigation and guidance; and radio blackout. For related information see also *04 Aircraft Communications and Navigation* and *32 Communications and Radar.*

N.A.—no abstracts were assigned to this category for this issue.

18 SPACECRAFT DESIGN, TESTING AND PERFORMANCE **360**
Includes satellites; space platforms; space stations; spacecraft systems and components such as thermal and environmental controls; and attitude controls. For life support systems see *54 Man/System Technology and Life Support.* For related information see also *05 Aircraft Design, Testing and Performance, 39 Structural Mechanics,* and *16 Space Transportation.*

19 SPACECRAFT INSTRUMENTATION ..... **N.A.**
For related information see also *06 Aircraft Instrumentation* and *35 Instrumentation and Photography.*

20 SPACECRAFT PROPULSION AND POWER **362**
Includes main propulsion systems and components, e.g., rocket engines; and spacecraft auxiliary power sources. For related information see also *07 Aircraft Propulsion and Power, 28 Propellants and Fuels, 44 Energy Production and Conversion,* and *15 Launch Vehicles and Space Vehicles.*

CHEMISTRY AND MATERIALS

23 CHEMISTRY AND MATERIALS (GENERAL) ..... **N.A.**

24 COMPOSITE MATERIALS **363**
Includes physical, chemical, and mechanical properties of laminates and other composite materials. For ceramic materials see *27 Nonmetallic Materials.*

25 INORGANIC AND PHYSICAL CHEMISTRY **366**
Includes chemical analysis, e.g., chromatography; combustion theory; electrochemistry; and photochemistry. For related information see also *77 Thermodynamics and Statistical Physics.*

26 METALLIC MATERIALS **370**
Includes physical, chemical, and mechanical properties of metals, e.g., corrosion; and metallurgy.

27 NONMETALLIC MATERIALS **374**
Includes physical, chemical, and mechanical properties of plastics, elastomers, lubricants, polymers, textiles, adhesives, and ceramic materials. For composite materials see *24 Composite Materials.*

28 PROPELLANTS AND FUELS **377**
Includes rocket propellants, igniters and oxidizers; their storage and handling procedures; and aircraft fuels. For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power,* and *44 Energy Production and Conversion.*

29 MATERIALS PROCESSING **378**
Includes space-based development of products and processes for commercial application. For biological materials see *55 Space Biology.*

ENGINEERING For related information see also *Physics.*

31 ENGINEERING (GENERAL) **379**
Includes vacuum technology; control engineering; display engineering; cryogenics; and fire prevention.

32 COMMUNICATIONS AND RADAR **379**
Includes radar; land and global communications; communications theory; and optical communications. For related information see also *04 Aircraft Communications and Navigation* and *17 Space Communications, Spacecraft Communications, Command and Tracking.* For search and rescue see *03 Air Transportation and Safety,* and *16 Space Transportation.*

33 ELECTRONICS AND ELECTRICAL ENGINEERING **382**
Includes test equipment and maintainability; components, e.g., tunnel diodes and transistors; microminiaturization; and integrated circuitry. For related information see also *60 Computer Operations and Hardware* and *76 Solid-State Physics.*

34 FLUID MECHANICS AND HEAT TRANSFER **387**
Includes boundary layers; hydrodynamics; fluidics; mass transfer and ablation cooling. For related information see also *02 Aerodynamics* and *77 Thermodynamics and Statistical Physics.*

35 INSTRUMENTATION AND PHOTOGRAPHY **393**
Includes remote sensors; measuring instruments and gauges; detectors; cameras and photographic supplies; and holography. For aerial photography see *43 Earth Resources and Remote Sensing.* For related information see also *06 Aircraft Instrumentation* and *19 Spacecraft Instrumentation.*

36 LASERS AND MASERS **396**
Includes parametric amplifiers. For related information see also *76 Solid-State Physics.*

37 MECHANICAL ENGINEERING **399**
Includes auxiliary systems (nonpower); machine elements and processes; and mechanical equipment.

38 QUALITY ASSURANCE AND RELIABILITY **403**
Includes product sampling procedures and techniques; and quality control.

39 STRUCTURAL MECHANICS **404**
Includes structural element design and weight analysis; fatigue; and thermal stress. For applications see *05 Aircraft Design, Testing and Performance* and *18 Spacecraft Design, Testing and Performance.*

GEOSCIENCES For related information see also *Space Sciences.*

42 GEOSCIENCES (GENERAL) ..... **N.A.**

43 EARTH RESOURCES AND REMOTE SENSING **408**
Includes remote sensing of earth resources by aircraft and spacecraft; photogrammetry; and aerial photography. For instrumentation see *35 Instrumentation and Photography.*

44 ENERGY PRODUCTION AND CONVERSION **409**
Includes specific energy conversion systems, e.g., fuel cells; global sources of energy; geophysical conversion; and windpower. For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power,* and *28 Propellants and Fuels.*

45 ENVIRONMENT POLLUTION **412**
Includes atmospheric, noise, thermal, and water pollution.

46 GEOPHYSICS **416**
Includes aeronomy; upper and lower atmosphere studies; ionospheric and magnetospheric physics; and geomagnetism. For space radiation see *93 Space Radiation.*

47 METEOROLOGY AND CLIMATOLOGY **417**
Includes weather forecasting and modification.

48 OCEANOGRAPHY **419**
Includes biological, dynamic, and physical oceanography; and marine resources. For related information see also *43 Earth Resources and Remote Sensing.*

LIFE SCIENCES

51 LIFE SCIENCES (GENERAL) **420**

52 AEROSPACE MEDICINE **423**
Includes physiological factors; biological effects of radiation; and effects of weightlessness on man and animals.

53 BEHAVIORAL SCIENCES **425**
Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

54 MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT **425**
Includes human engineering; biotechnology; and space suits and protective clothing. For related information see also *16 Space Transportation.*

55 SPACE BIOLOGY ..... **N.A.**
Includes exobiology; planetary biology; and extraterrestrial life.

MATHEMATICAL AND COMPUTER SCIENCES

59 MATHEMATICAL AND COMPUTER SCIENCES (GENERAL) **427**

60 COMPUTER OPERATIONS AND HARDWARE **429**
Includes hardware for computer graphics, firmware, and data processing. For components see *33 Electronics and Electrical Engineering.*

61 COMPUTER PROGRAMMING AND SOFTWARE **430**
Includes computer programs, routines, algorithms, and specific applications, e.g., CAD/CAM.

62 COMPUTER SYSTEMS **438**
Includes computer networks and special application computer systems.

63 CYBERNETICS **441**
Includes feedback and control theory, artificial intelligence, robotics and expert systems. For related information see also *54 Man/System Technology and Life Support.*

64 NUMERICAL ANALYSIS **447**
Includes iteration, difference equations, and numerical approximation.

65 STATISTICS AND PROBABILITY **451**
Includes data sampling and smoothing; Monte Carlo method; and stochastic processes.

66 SYSTEMS ANALYSIS **451**
Includes mathematical modeling; network analysis; and operations research.

67 THEORETICAL MATHEMATICS **452**
Includes topology and number theory.

PHYSICS For related information see also *Engineering.*

70 PHYSICS (GENERAL) **453**
For precision time and time interval (PTTI) see *35 Instrumentation and Photography;* for geophysics, astrophysics or solar physics see *46 Geophysics, 90 Astrophysics,* or *92 Solar Physics.*

71 ACOUSTICS **453**
Includes sound generation, transmission, and attenuation. For noise pollution see *45 Environment Pollution.*

72 ATOMIC AND MOLECULAR PHYSICS **454**
Includes atomic structure, electron properties, and molecular spectra.

73 NUCLEAR AND HIGH-ENERGY PHYSICS **462**
Includes elementary and nuclear particles; and reactor theory. For space radiation see *93 Space Radiation.*

74 OPTICS **464**
Includes light phenomena and optical devices. For lasers see *36 Lasers and Masers.*

75 PLASMA PHYSICS **467**
Includes magnetohydrodynamics and plasma fusion. For ionospheric plasmas see *46 Geophysics.* For space plasmas see *90 Astrophysics.*

76 SOLID-STATE PHYSICS **475**
Includes superconductivity. For related information see also *33 Electronics and Electrical Engineering* and *36 Lasers and Masers.*

77 THERMODYNAMICS AND STATISTICAL PHYSICS **481**
Includes quantum mechanics; theoretical physics; and Bose and Fermi statistics. For related information see also *25 Inorganic and Physical Chemistry* and *34 Fluid Mechanics and Heat Transfer.*

SOCIAL SCIENCES

80 SOCIAL SCIENCES (GENERAL) **482**
Includes educational matters.

81 ADMINISTRATION AND MANAGEMENT **482**
Includes management planning and research.

82 DOCUMENTATION AND INFORMATION SCIENCE **483**
Includes information management; information storage and retrieval technology; technical writing; graphic arts; and micrography. For computer documentation see *61 Computer Programming and Software.*

83 ECONOMICS AND COST ANALYSIS **485**
Includes cost effectiveness studies.

84 LAW, POLITICAL SCIENCE AND SPACE POLICY ..... **N.A.**
Includes NASA appropriation hearings; aviation law; space law and policy; international law; international cooperation; and patent policy.

85 URBAN TECHNOLOGY AND TRANSPORTATION **485**
Includes applications of space technology to urban problems; technology transfer; technology assessment; and surface and mass transportation. For related information see *03 Air Transportation and Safety, 16 Space Transportation,* and *44 Energy Production and Conversion.*

SPACE SCIENCES For related information see also *Geosciences.*

88 SPACE SCIENCES (GENERAL) ..... **N.A.**

89 ASTRONOMY **485**
Includes radio, gamma-ray, and infrared astronomy; and astrometry.

90 ASTROPHYSICS **500**
Includes cosmology; celestial mechanics; space plasmas; and interstellar and interplanetary gases and dust. For related information see also *75 Plasma Physics.*

91 LUNAR AND PLANETARY EXPLORATION **515**
Includes planetology; and manned and unmanned flights. For spacecraft design or space stations see *18 Spacecraft Design, Testing and Performance.*

92 SOLAR PHYSICS **517**
Includes solar activity, solar flares, solar radiation and sunspots. For related information see *93 Space Radiation.*

93 SPACE RADIATION **518**
Includes cosmic radiation; and inner and outer earth's radiation belts. For biological effects of radiation see *52 Aerospace Medicine.* For theory see *73 Nuclear and High-Energy Physics.*

GENERAL

Includes aeronautical, astronautical, and space science related histories, biographies, and pertinent reports too broad for categorization; histories or broad overviews of NASA programs.

99 GENERAL **519**

SUBJECT INDEX **I-1**

PERSONAL AUTHOR INDEX **I-67**

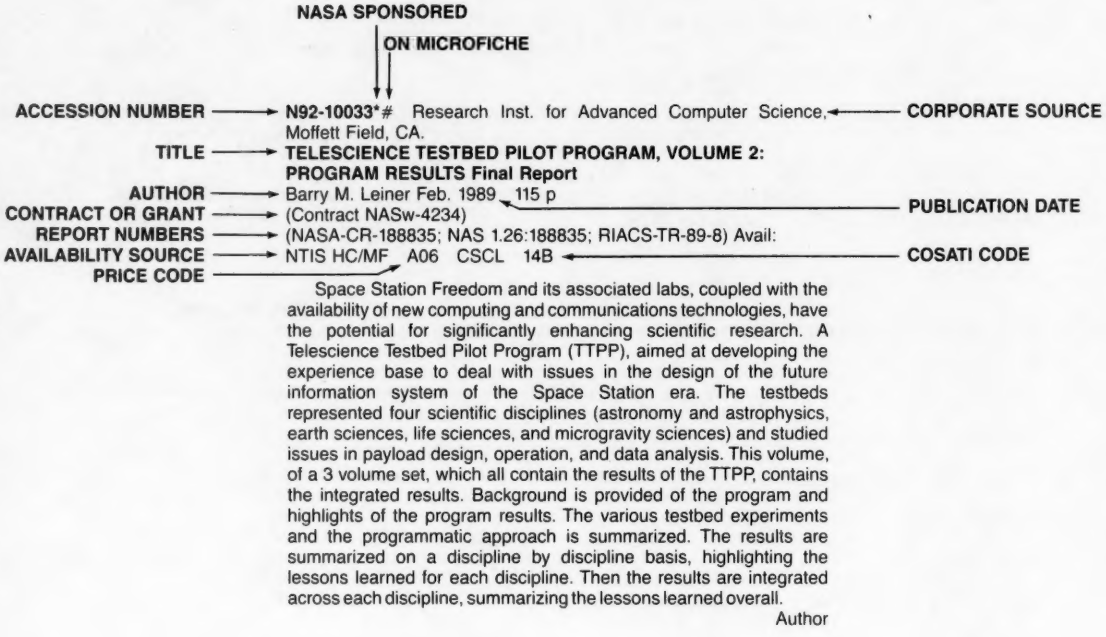
CORPORATE SOURCE INDEX **I-75**

CONTRACT NUMBER INDEX **I-87**

REPORT/ACCESSION NUMBER INDEX **I-89**

APPENDIX **A-1**

TYPICAL CITATION AND ABSTRACT



Space Station Freedom and its associated labs, coupled with the availability of new computing and communications technologies, have the potential for significantly enhancing scientific research. A Telescience Testbed Pilot Program (TTPP), aimed at developing the experience base to deal with issues in the design of the future information system of the Space Station era. The testbeds represented four scientific disciplines (astronomy and astrophysics, earth sciences, life sciences, and microgravity sciences) and studied issues in payload design, operation, and data analysis. This volume, of a 3 volume set, which all contain the results of the TTPP, contains the integrated results. Background is provided of the program and highlights of the program results. The various testbed experiments and the programmatic approach is summarized. The results are summarized on a discipline by discipline basis, highlighting the lessons learned for each discipline. Then the results are integrated across each discipline, summarizing the lessons learned overall.

Author

VOLUME 30 NUMBER 3 / FEBRUARY 8, 1992

Scientific and Technical Aerospace Reports

A Semimonthly Publication of the National Aeronautics and Space Administration

01 AERONAUTICS (GENERAL)

N92-12538# National Aerospace Lab., Amsterdam (Netherlands).
A KNOWLEDGE-BASED ASSISTANT FOR DIAGNOSIS IN AIRCRAFT MAINTENANCE
M. A. Piers and J. C. Donker *In* AGARD, Machine Intelligence for Aerospace Electronic Systems Sep. 1991 7 p (For primary document see N92-12517 03-63)
Copyright Avail: NTIS HC/MF A14; Non-NATO Nationals requests available only from AGARD/Scientific Publications Executive

02 AERODYNAMICS

Includes aerodynamics of bodies, combinations, wings, rotors, and control surfaces; and internal flow in ducts and turbomachinery.

For related information see also *34 Fluid Mechanics and Heat Transfer.*

N92-11966# Sandia National Labs., Albuquerque, NM.
SLOTTED-WALL RESEARCH WITH DISK AND PARACHUTE MODELS IN THE DSMA LOW-SPEED WIND TUNNEL
D. VanEvery and J. L. Harris (DSMA International, Inc., Mississauga, Ontario) Jun. 1990 109 p
(Contract DE-AC04-76DP-00789)
(DE90-013631; SAND-89-7064) Avail: NTIS HC/MF A06

A test program investigated the effects of wall open area ratio (OAR) and model axial position on the measured drag of disk and parachute models in a low speed wind tunnel. The data and discussion presented in this report provide new insight into the nature of slotted-wall interference for bluff bodies in steady flow and give the first quantitative information on nonsteady wall interference and airflow response during the inflation of a parachute. The report concludes that a fixed OAR of between 5 and 15 pct. should eliminate wall interference during inflation and greatly reduce steady flow interference for geometric blockages up to 15 pct. Preliminary arguments suggest that an optimum OAR may be found that alleviates wall interference for large models at low speeds while providing for acceptable testing of smaller models in the transonic speed range. DOE

N92-11967 ESDU International Ltd., London (England).
PITCHING MOMENT DERIVATIVE DUE TO RATE OF PITCH FOR PROJECTILES AT SUPERSONIC SPEEDS
May 1991 21 p
(ESDU-91004; ISBN-0-85679-766-9; ISSN-0141-397X) Avail: ESDU

ESDU 91004 gives a semiempirical method for estimating the derivative for an axisymmetric forebody cylinder combination with or without boat tailing and fins. Slender body theory provides an equation for the sum of the pitching moment derivatives due to pitch rate and due to acceleration in heave that is modified empirically to correlate tunnel and range data extracted from the literature. It involves the normal force curve slope which is obtained from ESDU 89008 with correction from ESDU 87033 for the effect of boat tailing. To obtain the pitch rate derivative, the slender body prediction for the derivative due to acceleration in heave is subtracted from the predicted sum; that requires the pitching moment curve slope also obtained from ESDU 89008 and 87033. For the body alone, predictions are within 20 percent of the experimental values. It is noted that higher values of the acceleration in heave derivative can occur when transition occurs at the base, but values for the sum of the derivatives predicted by ESDU 91004 are conservative and apply when transition is near the pitching axis; this effect does not influence the pitch rate derivative. Range data had a greater scatter then tunnel data and it is suggested that incorrect magnus effect corrections could cause that. A method is suggested for including the effect of fins, which is empirical and based on limited data. It involves modifying the body alone prediction and using ESDU 70012 to obtain the normal force curve slope, ESDU Aero 91007 for body interference, and ESDU 70012 for the aerodynamic centre of the surfaces. Worked examples illustrate the use of the method and sketches show typical correlations achieved. ESDU

N92-11968 ESDU International Ltd., London (England).
LIFT-CURVE SLOPE OF WING-BODY COMBINATIONS
Jun. 1991 17 p Supersedes ESDU-Aero-A.S.01.03.01
(ESDU-91007; ESDU-Aero-A.S.01.03.01; ISBN-0-85679-769-3; ISSN-0141-497X) Avail: ESDU

ESDU 91007 discusses missiles in which interference loads make a large contribution because of the small span to body diameter ratio. In this case, an axisymmetric body with midwing is considered at low angles of attack (less than 2 degrees) in subsonic or supersonic flow. The method takes the body alone contribution (ESDU 89008 provides values for forebody cylinders) and adds contributions from the wing (in the presence of the body) and from the change in body lift curve slope due to the wing. Both contributions are obtained by factoring the isolated wing lift curve slope from ESDU 70011 or 70012 (for subsonic supersonic flow respectively). Equations and graphs are given for the factors. The wing factor is a function of span to body diameter ratio, while, at supersonic speeds, the body correction factor depends on whether the Mach line from the wing tip intersects the root chord or passes downstream of its trailing edge. In the latter case the factor is a function of body length downstream of the wing. The method applies to straight or swept forward trailing edges, but has been found satisfactory for moderate trailing edge sweeps. It is found to compare with experiment within about 10 percent. A worked example illustrates the use of the method. ESDU

N92-11969 ESDU International Ltd., London (England).
EFFECT OF TWIN FINS ON ISOLATED TAILPLANE LIFT-CURVE SLOPE
Jul. 1991 7 p
(ESDU-91009; ISBN-0-85679-771-5; ISSN-0141-397X) Avail: ESDU

ESDU 91009 discusses a method that is based on determining the effective (increased) aspect ratio of the tailplane due to the end plate effect of the fins. ESDU 70011 is then used to estimate the lift curve slope for that effective aspect ratio. Wind tunnel data drawn from the literature for a wide range of configurations were used to correlate the effective aspect ratio (determined using ESDU 70011) as a function of the ratio fin height/tailplane span and fin spanwise position. The data were correlated to within 5 percent and applied to straight tapered tailplanes of taper ratio

between 1 and 0.4 (tip chord/centerline chord) and mid chord sweep up to 45 degrees, for any fin planform, and are independent of fin vertical location on the tailplane. For swept tailplanes the correlation only applies when the fin chord extends well forward of the tailplane leading edge (by at least 0.25 chord). It is restricted to attached flow at subcritical speeds. The ranges of the geometries for the test data used in the correlation are tabulated, sketches show plots comparing predicted with experimental results, and a worked example illustrates the use of the data. ESDU

N92-11970 ESDU International Ltd., London (England).
MAXIMUM LIFT OF WINGS WITH TRAILING-EDGE FLAPS AT LOW SPEEDS
Aug. 1991 21 p
(ESDU-91014; ISBN-0-85679-776-6; ISSN-0141-397X) Avail: ESDU

A method is given that involves the calculation of two components: the increment in maximum lift coefficient due to flaps is added to the maximum lift coefficient for the wing with flaps undeployed determined from ESDU 89034. The first component is calculated using ESDU 85033 applied to the most highly loaded section, factored for effects of aspect ratio, taper ratio, and wing sweep in addition to flap part span effects. The method was developed using wind tunnel data from many sources for a wide range of planform parameters (aspect ratios from 3 to 9 and leading edge sweep up to 50 degs) for which it was found to correlate the predicted increment generally within 10 pct. and the maximum lift of the wing with flaps deployed to within 5 pct. It applies for freestream Mach numbers less than 0.25 for plain, split, or single or multi-slotted flaps. Sketches of predictions plotted against test results illustrate the quality of the estimation and a detailed worked example illustrates the use of the method. ESDU

N92-11971# Centre d'Etudes et de Recherches, Toulouse (France). Dept. d'Etudes et de Recherches en Aerothermodynamique.
STUDY OF HYPERSONIC FLOW TURBULENCE MODELS Final Report [ETUDE DE MODELES DE TURBULENCE EN ECOULEMENT HYPERSONIQUE. RAPPORT FINAL]
B. Aupoix Dec. 1990 51 p In FRENCH
(Contract DRET-89-002-00-034)
(CERT-RF-36/5005-32; ETN-91-90076) Avail: NTIS HC/MF A04

Predictions of boundary layer profiles are compared. A particular interest is taken in the models with transport equations. These models are more apt to take into account turbulence disequilibrium effects due to longitudinal pressure gradients. However, the models with transport equations give poor predictions in the wall region, where turbulence is at equilibrium. Use of a simplified model with one single equation in the wall region and two equations in the external region is described. Direct simulations of homogeneous turbulence are analyzed to test models for the extra terms appearing in the transport equation representing the kinetic energy of turbulence in compressible flow. The use of direct simulations to explore compressible turbulence physics and validation models is shown. ESA

N92-11972# Office National d'Etudes et de Recherches Aerospatiales, Paris (France). Direction de la Physique Generale.
THERMOGRAPHIC GUST WIND TUNNEL MEASUREMENTS Final Report [MESURES THERMOGRAPHIQUES EN SOUFFLERIE A RAFALES. RAPPORT FINAL]
M. Girard Aug. 1990 41 p In FRENCH
(Contract DRET-BC-87-001-54)
(ONERA-RF-31/3409-PY; ETN-91-90087) Avail: NTIS HC/MF A03

A test campaign at the R3Ch gust wind tunnel using a space plane type model is reported. Information storage problems are discussed. The results are transferred to the French aerodynamic management (OA) in magnetic tape form. Additionally, the image inventory analysis methods are transferred to the OA. ESA

N92-11973# Technische Univ., Eindhoven (Netherlands). Vakgroep Transportfysica.
ON THE LIMITATIONS OF FROUDE'S ACTUATOR DISC CONCEPT Ph.D. Thesis
Gijsbertus Arnoldus vanKuik 1991 151 p
(ETN-91-90136) Avail: NTIS HC/MF A08

The question of whether the actuator disc including edge forces is a better representation of the action of conventional helicopter or wind turbine rotors than Froude's mathematical model is addressed. The load on the chordwise bound vorticity of the rotor blade is shown not to perform work, which conflicts with Froude's assumption of the load converting power being equal to the total load. An experiment on a model rotor in hover shows the load converting power to be smaller than the total load on the rotor. It is concluded that the addition of edge forces to Froude's concept improves the performance prediction for rotors significantly, although discrepancies between prediction and measurement remain. The actuator disc itself is addressed and the question of whether the edge forces are an inherent part of the load instead of merely an addition to Froude's concept is addressed numerically and analytically to improve the representation of real rotors. A nonlinear viscous finite element calculation is set up for the flow of a two dimensional actuator strip with a smooth load distribution. ESA

N92-11974# Toronto Univ. (Ontario). Inst. for Aerospace Studies.
OVER FORTY YEARS OF CONTINUOUS RESEARCH AT UTIAS ON NONSTATIONARY FLOWS AND SHOCK WAVES
I. I. Glass Dec. 1990 35 p Previously announced in IAA as A91-44831 Sponsored by National Sciences and Engineering Research Council
(UTIAS-50; ISSN-0082-5247; CTN-91-60254) Avail: NTIS HC/MF A03

Analytical and experimental research on nonstationary shock waves, rarefaction waves, and contact surfaces was conducted continuously at University of Toronto, Institute for Aerospace Studies (UTIAS) since its inception in 1948. Some unique facilities were used to study the properties of planar, cylindrical, and spherical shock waves and their interactions. Investigations were also performed on shock-wave structure and boundary layers in ionizing argon, water-vapor condensation in rarefaction waves, magneto-gasdynamic flows, and the regions of regular and various types of Mach reflections of oblique shock waves. Explosively driven implosions were employed as drivers for projectile launchers and shock tubes, and as a means of producing industrial-type diamonds from graphite, and fusion plasmas in deuterium. The effects of sonic-boom on humans, animals, and structures have also formed an important part of the investigations. More recently, interest has focussed on shock waves in dusty gases, the viscous and vibrational structure of weak spherical blast waves in air, and oblique shock-wave reflections. In all of these studies instrumentation and computational methods have played a very important role. A brief survey of this work is given herein and in more detail in the relevant references. Author (CISTI)

N92-11975# National Research Council of Canada, Ottawa (Ontario). Inst. for Aerospace Research.
WIND TUNNEL TESTS ON A4, A4.1, AND A4.2 2-D AIRFOIL MODELS IN THE IAR 5-FT. WIND TUNNEL: BOEING COMMERCIAL AIRPLANE COMPANY AND INSTITUTE FOR AEROSPACE RESEARCH COLLABORATIVE WORK PROGRAM
Y. Nishimura Nov. 1990 683 p Sponsored in part by Boeing Commercial Airplane Co.
(NRC-IAR-C3; NRC-LTR-HA-5X5/0196; CTN-91-60255) Avail: NTIS HC/MF A99

A wind tunnel project was undertaken to obtain aerodynamic data to investigate the influence of the wind tunnel sidewall boundary layer effects by testing models with different aspect ratios. Wind tunnel investigations were performed on three airfoil models with the same airfoil section but with different chord lengths. The tests were performed over a Mach number range from 0.70 to

0.80 with the flow at a chord Reynolds number of 14 million. This project was undertaken as a collaborative wind tunnel program between Boeing Commercial Airplane Company and the Institute of Aerospace Research (Canada) to investigate the wall interference effects encountered during 2-D tests on transonic airfoils. The report includes some of the pertinent features of the test procedures, and the test parameters and variables used in the data processing procedures, to provide the information necessary to interpret the processed data. The analyses of the data are not included. CISTI

N92-11976# National Research Council of Canada, Ottawa (Ontario). High Speed Aerodynamics Lab.
THE BCAC/IAR COLLABORATIVE RESEARCH PROGRAM TO INVESTIGATE THE SIDEWALL BOUNDARY LAYER EFFECTS IN THE IAR/NRC 2-D HIGH REYNOLDS NUMBER TEST FACILITY Preliminary Report
Y. Nishimura 11 Jan. 1991 110 p
(NRC-HSA-434; CTN-91-60256) Avail: NTIS HC/MF A06

The Institute of Aerospace Research (IAR) and the Boeing Commercial Airplane Company (BOAC) formulated a collaborative wind tunnel program to investigate the degree of sidewall boundary layer effects by investigations on 2-D airfoil models with different aspect ratios. The first part of the plan was to examine sidewall boundary layer effects in the IAR 2-D High Reynolds Number Test Facility by acquiring data for three different airfoil models all with the same airfoil section but each with different chord lengths to provide three different aspect configurations. Secondly, another model with the same airfoil cross section and a chord length equal to that of the largest of the three earlier models but with a longer span is to be installed in the 3-D transonic test section of the IAR Blowdown Wind Tunnel as a 2-D model. The ranges of these chord and span dimensions are chosen to represent a fairly wide spectrum of model sizes and the results may determine the best size range for 2-D models to be tested in the IAR facility with minimal sidewall boundary layer effects. The tests of the three smaller models at the 2-D facility have been completed and this report presents the results from these investigations. CISTI

N92-11977*# National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.
INVESTIGATION OF THE AEROELASTIC STABILITY OF THE AFW WIND-TUNNEL MODEL USING CAP-TSD
Walter A. Silva and Robert M. Bennett Sep. 1991 12 p Presented at the AGARD Specialists Meeting, San Diego, CA, 6-11 Oct. 1991
(NASA-TM-104142; NAS 1.15:104142) Avail: NTIS HC/MF A03 CSCL 01A

The Computational Aeroelasticity Program - Transonic Small Disturbance (CAP-TSD) code, developed at the NASA Langley Research Center, is applied to the Active Flexible Wing (AFW) wind tunnel model for prediction of the model's transonic aeroelastic behavior. A semi-span computational model is used for evaluation of symmetric motions and a full span model is used for evaluation of antisymmetric motions. Static aeroelastic solutions using CAP-TSD are computed. Dynamic (flutter) analyses are then performed as perturbations about the static aeroelastic deformations and presented as flutter boundaries in terms of Mach number and dynamic pressure. Flutter boundaries that take into account modal refinements, vorticity and entropy corrections, antisymmetric motions and sensitivity to the modeling of the wing tip ballast stores are also presented and compared with experimental flutter results. Author

N92-11978# Laboratoire d'Aerothermique du CNRS, Meudon (France).
COMPRESSION RAMP IN RAREFIED GAS Final Report [RAMPE DE COMPRESSION EN GAZ RAREFIE. RAPPORT FINAL]
J. C. Lengrand, K. S. Heffner, and A. Chpoun Dec. 1990 70 p In FRENCH
(Contract DRET-89-34-080-00-47075-01)
(RC-90-08; ETN-91-90100) Avail: NTIS HC/MF A04

Comparisons are made between the Direct Simulation Monte Carlo (DSMC) method, the results obtained using Navier-Stokes equations, and experimental results, in terms of their ability to predict the thermodynamics of atmospheric entry by a spacecraft. The experimental results used are those obtained using a SR3 wind tunnel. A compression ramp is placed within a supersonic flow. The compression ramp is modeled after the tail section of the Space Shuttle. The experiments are carried out at a flow rate of Mach 4 in moderately rarified gas and at Mach 20.2 in a very rarefied gas environment. ESA

N92-11979# Laboratoire d'Aerothermique du CNRS, Meudon (France).
FLAT PLANES IN RAREFIED HYPERSONIC FLOWS Final Summary Report [PLAQUES PLANES PLACEES EN ECOULEMENTS HYPERSONIQUES RAREFIES. RAPPORT FINAL DE SYNTHESE]
J. Allegre, M. Raffin, J. C. Lengrand, A. Chpoun, and L. Gottesdiener (Paris VI Univ., France) Jan. 1991 82 p In FRENCH
(Contract DRET-88-251)
(SESSIA-430/91-940; ETN-91-90101) Avail: NTIS HC/MF A05

Experimental density fields measured in wind tunnel tests are compared with the density fields calculated by means of Monte Carlo and Navier-Stokes methods. Extra wind tunnel tests measuring heat flux and wall pressures are needed to be able to compare the experimental values with values calculated using the Direct Simulation Monte Carlo (DSMC) and Navier-Stokes equations. The results of the tests are presented in full. ESA

N92-11980# Ecole Nationale Superieure de Mecanique et d'Aerotechnique, Poitiers (France). Lab. d'Aerodynamique.
NONSTATIONARY FLIGHT AERODYNAMICS IN A TURBULENT ENVIRONMENT Final Summary Report [AERODYNAMIQUE INSTATIONNAIRE DU VOL EN MILIEU TURBULENT. RAPPORT DE SYNTHESE FINAL]
P. Ardonceau and F. Micheli Jul. 1990 72 p In FRENCH
(Contract DRET-85-072)
(ETN-91-90102) Avail: NTIS HC/MF A04

Experimental results of wind tunnel tests on a rectangular wing panel and on a half delta wing submitted to oscillations are described. Charts of nonstationary wing pressures, of flow deflection at the trailing edge of the wing and visualizations of the wing wake are presented. A second series of tests carried out on a flying scale model of the Rafale aircraft are described. The wing pressures and local flow over the wing are quantified for flight close to the ground and in meteorologically perturbed conditions. The results of these tests are presented. ESA

N92-11981# Centre d'Etudes Aerodynamiques et Thermiques, Poitiers (France).
CONTROL ASPECTS OF THE TRANSITION FROM TRANSVERSAL TO TRANSONIC FLOW, STEP EFFECTS Final Report [CONTROLE DE LA TRANSITION TRANSVERSALE EN TRANSSONIQUE PAR ASPIRATION: EFFET DE MARCHES. RAPPORT FINAL]
R. Leblanc and H. Garem Dec. 1990 19 p In FRENCH
(Contract DRET-89-1170)
(ETN-91-90106) Avail: NTIS HC/MF A03

Transonic wind tunnel tests are used to study transitions along an arrowhead shaped wing and the control of this wing by suction along it's leading edge. The effects of ascendent and descendent steps is considered. The goal of the research is that of delaying the laminar surface layer transitions triggered by the transverse pressure gradient in order to reduce the viscous trail of the airplanes, thus reducing their overall operating costs and increasing their operating range. The wind tunnel tests carried out in a scale model of an arrowhead shaped wing indicate that step effects lead to too much flow perturbation over the wing. ESA

N92-11982# Institut de Mecanique des Fluides de Lille (France).
PHENOMENOLOGICAL MODELING OF THE WAKE PRODUCED BY A STRAIGHT TWO DIMENSIONAL BASE IN SUBSONIC FLOW [MODELISATION PHENOMENOLOGIQUE DU SILLAGE D'UN CULOT DROIT BIDIMENSIONNEL EN ECOULEMENT SUBSONIQUE]
O. Rodriguez 21 Dec. 1990 59 p In FRENCH
(Contract DRET-89-003-07)
(Rept-90/59; ETN-91-90109) Avail: NTIS HC/MF A04

Wake turbulence phenomena at subsonic speeds are studied. The aerodynamic phenomena leading to detachment and large spinning structures in wakes is given particular attention. A better understanding of these phenomena is needed to comprehend wake reduction measures and jet homogenization techniques. The results of numerous wind tunnel tests are presented. They show that the development of spinning eddies of turbulence is similar no matter the height of the base or the Reynolds or Mach number involved. ESA

N92-11983*# Cornell Univ., Ithaca, NY.
FLOW VISUALIZATION AND FLOW FIELD MEASUREMENTS OF A 1/12 SCALE TILT ROTOR AIRCRAFT IN HOVER
Charles D. Coffen, Albert R. George, Hal Hardinge, and Ryan Stevenson [1991] 29 p
(Grant NAG2-554)
(NASA-CR-189456; NAS 1.26:189456) Avail: NTIS HC/MF A03 CSCL 01A

The results are given of flow visualization studies and inflow velocity field measurements performed on a 1/12 scale model of the XV-15 tilt rotor aircraft in the hover mode. The complex recirculating flow due to the rotor-wake-body interactions characteristic of tilt rotors was studied visually using neutrally buoyant soap bubbles and quantitatively using hot wire anemometry. Still and video photography were used to record the flow patterns. Analysis of the photos and video provided information on the physical dimensions of the recirculating fountain flow and on details of the flow including the relative unsteadiness and turbulence characteristics of the flow. Recirculating flows were also observed along the length of the fuselage. Hot wire anemometry results indicate that the wing under the rotor acts to obstruct the inflow causing a deficit in the inflow velocities over the inboard region of the model. Hot wire anemometry also shows that the turbulence intensities in the inflow are much higher in the recirculating fountain reingestion zone. Author

N92-11984*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, CA.
AN ASSESSMENT AND APPLICATION OF TURBULENCE MODELS FOR HYPERSONIC FLOWS
T. J. Coakley, J. R. Viegas, P. G. Huang, and M. W. Rubesin 1990 25 p Presented at the Ninth National Aero-Space Plane Technology Symposium, 1-2 Nov. 1990
(NASA-TM-105124; NAS 1.15:105124; Paper-106) Avail: NTIS HC/MF A03 CSCL 01A

The current approach to the Accurate Computation of Complex high-speed flows is to solve the Reynolds averaged Navier-Stokes equations using finite difference methods. An integral part of this approach consists of development and applications of mathematical turbulence models which are necessary in predicting the aerothermodynamic loads on the vehicle and the performance of the propulsion plant. Computations of several high speed turbulent flows using various turbulence models are described and the models are evaluated by comparing computations with the results of experimental measurements. The cases investigated include flows over insulated and cooled flat plates with Mach numbers ranging from 2 to 8 and wall temperature ratios ranging from 0.2 to 1.0. The turbulence models investigated include zero-equation, two-equation, and Reynolds-stress transport models. Author

N92-11985*# National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.
ON SIMPLE AERODYNAMIC SENSITIVITY DERIVATIVES FOR USE IN INTERDISCIPLINARY OPTIMIZATION
Robert V. Doggett, Jr. Aug. 1991 18 p
(NASA-TM-104145; NAS 1.15:104145) Avail: NTIS HC/MF A03 CSCL 01A

Low-aspect-ratio and piston aerodynamic theories are reviewed as to their use in developing aerodynamic sensitivity derivatives for use in multidisciplinary optimization applications. The basic equations relating surface pressure (or lift and moment) to normal wash are given and discussed briefly for each theory. The general means for determining selected sensitivity derivatives are pointed out. In addition, some suggestions in very general terms are included as to sample problems for use in studying the process of using aerodynamic sensitivity derivatives in optimization studies. Author

03 AIR TRANSPORTATION AND SAFETY

Includes passenger and cargo air transport operations; and aircraft accidents.

For related information see also *16 Space Transportation* and *85 Urban Technology and Transportation.*

N92-11986# Defence and Civil Inst. of Environmental Medicine, Downsview (Ontario).
EJECTION SYSTEMS AND THE HUMAN FACTOR: A GUIDE FOR FLIGHT SURGEONS AND AEROMEDICAL TRAINERS
Wayne R. Sturgeon Feb. 1988 89 p
(DCIEM-88-TR-16; CTN-91-60228) Avail: NTIS HC/MF A05

This report outlines the Canadian Forces experience with ejection escape systems and the human factors involvement in their use during the period 1952 through 1987. It is intended as an introductory guide to flight surgeons and other aeromedical personnel in the Canadian Forces investigating accidents or incidents involving ejection systems, or for personnel responsible for training aircrew in the use of ejection systems. The report analyses human factors involvement in ejection decision formulation and the medical or physiological considerations of the ejection, descent, landing, and survival phases of the escape sequence. A total of 485 ejections or attempted ejections were identified and analyzed. These ejections resulted in a total of 94 fatalities. A substantial number of injuries also occurred. Problems encountered were grouped into three general categories for analysis: (1) failure to eject; (2) equipment problems after ejection, and (3) out of envelope problems. Case histories are used to illustrate the hazards involved in ejection escape. Emphasis is placed on ejection statistics collected during the period 1952 through 1958. It is recommended that aircrew be regularly briefed on the rapid decision requirements on ejection at low altitude, and of ejection physiology. CISTI

04 AIRCRAFT COMMUNICATIONS AND NAVIGATION

Includes digital and voice communication with aircraft; air navigation systems (satellite and ground based); and air traffic control.

For related information see also *17 Space Communications, Spacecraft Communications, Command and Tracking* and *Communications and Radar.*

N92-11987 Colorado Univ., Boulder.
PRECISE RELATIVE SEA SURFACE POSITIONING OF A FLOATING PLATFORM USING THE GLOBAL POSITIONING SYSTEM (GPS) Ph.D. Thesis
Thomas Matthew Kelecy 1990 285 p
Avail: Univ. Microfilms Order No. DA9122618

Within the next decade and beyond we will witness a significant

increase in programs and scientific research designed to monitor and study the Earth as a system. Coinciding with these efforts will be the establishment of the operational constellation of Global Positioning System (GPS) satellites which will provide the capability for meter-level absolute positioning, and precise centimeter-level relative positioning over most of the globe. GPS can be a valuable supplement to oceanographic and geodetic studies if its application to accurate sea surface positioning can be demonstrated. The ability to obtain precise in situ sea surface height measurements, relative to a fixed reference site on land, would accommodate a wide range of applications which rely on monitoring precise sea-level. GPS receivers, mounted to buoys or ships deployed on the ocean, would provide a means for nearly global coverage as well as a nearly continuous time series of data. The primary objective of this work is to demonstrate whether if not GPS can be used to measure precise and accurate relative sea surface positions. Phenomena known to contribute to the degradation of accuracy are modeled and analyzed in the context of precise positioning of a floating platform. Conditions which allow sea level to be monitored with high accuracy, using GPS on a floating platform, are established. These conditions are used to determine algorithm requirements for processing GPS data to estimate sea surface position and relative sea level height. The results indicate that cm-level or better sea level measurements are obtainable. The measurement of wave spectra has also been demonstrated by comparison of GPS-determined and pressure transducer-determined wave time-series. Dissert. Abstr.

N92-11988# National Research Council of Canada, Ottawa (Ontario). Flight Research Lab.
TRACKING PERFORMANCE REQUIREMENTS FOR ROTORCRAFT INSTRUMENT APPROACHES TO REDUCED MINIMA. PHASE 1: PRELIMINARY STUDY
S. W. Baillie, S. Kereliuk, R. Srinivassan, and R. Hoh (Hoh Aeronautics, Inc., Lomita, CA.) Feb. 1991 40 p
(NRC-32137-Phase-1; IAR-AN-70-Phase-1; CTN-91-60278)
Copyright Avail: NTIS HC/MF A03

The ability to track approach guidance (position and speed) to a low decision height (50 feet) when performing a steep instrument approach (6 to 9 degrees) in a rotorcraft clearly has a profound effect on the success of the approach. This report describes a preliminary attempt to define approach tracking standards for such approaches and includes a systematic data base upon which such standards can be based. This data base was generated in a flight experiment in which qualified rotorcraft certification test pilots evaluated the suitability of arriving at the decision height with various combinations of approach tracking error. The magnitude of tracking errors that are compatible with satisfactory pilot workload in the transition to hover and landing is well defined and tracking within these error bounds is clearly within the limits of current technology. The experiment was performed on the National Research Council of Canada's Bell 205 Airborne Simulator. Author (CISTI)

N92-12529# Wright Lab., Wright-Patterson AFB, OH.
ADAPTIVE TACTICAL NAVIGATION PROGRAM
Sandra L. Berning and Douglas P. Glasson (Analytic Sciences Corp., Reading, MA.) *In* AGARD, Machine Intelligence for Aerospace Electronic Systems Sep. 1991 15 p (For primary document see N92-12517 03-63)
Copyright Avail: NTIS HC/MF A14; Non-NATO Nationals requests available only from AGARD/Scientific Publications Executive

N92-12530# Dayton Univ., OH.
LOCALLY LINEAR NEURAL NETWORKS FOR AEROSPACE NAVIGATION SYSTEMS
Steven C. Gustafson and Gordon R. Little *In* AGARD, Machine Intelligence for Aerospace Electronic Systems Sep. 1991 8 p (For primary document see N92-12517 03-63)
Copyright Avail: NTIS HC/MF A14; Non-NATO Nationals requests available only from AGARD/Scientific Publications Executive

05 AIRCRAFT DESIGN, TESTING AND PERFORMANCE

Includes aircraft simulation technology.

For related information see also *18 Spacecraft Design, Testing and Performance* and *39 Structural Mechanics.* For land transportation vehicles see *85 Urban Technology and Transportation.*

N92-11989 George Washington Univ., Washington, DC.
PRACTICAL INPUT OPTIMIZATION FOR AIRCRAFT PARAMETER ESTIMATION EXPERIMENTS Ph.D. Thesis
Eugene Arcangelo Morelli 1991 175 p
Avail: Univ. Microfilms Order No. DA9123065

Mathematical models of aircraft dynamics typically contain quantities called parameters, which depend, in general, on the flight condition and the aircraft geometry. It is important to be able to estimate these parameters accurately from flight testing the aircraft. The object was to develop an algorithm for the design of practical, optimal flight test inputs for aircraft parameter estimation experiments. This algorithm must be capable of designing multiple input experiments for estimation of open loop model parameters from closed loop flight test data. A general, single pass technique was developed which allows global optimization of the flight test input design for parameter estimation using the principles of dynamic programming. Provision was made for practical constraints on the input form, including amplitude constraints, control system dynamics, and selected input frequency range exclusions. A new formulation is presented of the optimal input design problem along with a description of a new approach to the solution, and a summary of the characteristics of the algorithm, followed by three example applications of the new technique which shows the quality and expanded capabilities of the input design produced by the technique. Dissert. Abstr.

N92-11990# National Research Council of Canada, Ottawa (Ontario). Structures and Materials Lab.
TUTOR AFT FUSELAGE AND EMPENNAGE FULL-SCALE FATIGUE TEST: RESOLUTION OF HORIZONTAL STABILIZER INSTALLATION DIFFICULTIES
B. E. Shaver and L. LeBlanc Nov. 1990 13 p
(Contract FE220787NRC01; IAR Proj. 07332)
(NRC-LTR-ST-1804; CTN-91-60261) Copyright Avail: NTIS HC/MF A03

Difficulty was experienced during an attempt to install the horizontal stabilizer bar from one CT-114 Tutor aircraft to another. The difficulty was caused by a misalignment of approximately 0.018 inches between holes in the horizontal stabilizer rear attachment fitting and mating holes in the horizontal stabilizer main attachment brackets. This report describes the investigation of the dimensional discrepancy and the solution that was used. Due to time constraints it was decided that altering the rear attachment fitting assembly to match the main attachment brackets on the horizontal stabilizer would be relatively simple and have minimal effect on the load paths or local structure. The steel bushings pressed into the fitting were removed and replaced with eccentric bushings manufactured specifically to deal with the dimensional discrepancy of the components. Bushings were manufactured from the same material and to the same specifications as the original except for the .009 inch offset of the inner surface relative to the outer surface. After 30,000 simulated flight hours no difficulties have been encountered with the bushings or the surrounding structure. Horizontal stabilizers should not be considered totally interchangeable within the fleet. The use of excessive force to install horizontal stabilizer attachment bolts should be avoided since unseen damage may be incurred by the surrounding structure and unnecessary residual stresses may be induced which could alter the fatigue life of the structure. CISTI

N92-11991# National Research Council of Canada, Ottawa (Ontario). Inst. of Aerospace Research.
CORROSION AND YOUR AIRCRAFT

G. F. Marsters Jun. 1988 10 p
(NRC-30465; NAE-Misc-63; CTN-91-60290) Copyright Avail: NTIS HC/MF A02

This article provides information about the nature and effects of corrosion on metal aircraft structures. It is written with the pilot/operator in mind and avoids detailed engineering and scientific treatments of the subject. It is highly descriptive in nature and has as its objective the enhancement of safety through increased awareness of the problems which corrosion can cause. It includes examples and data which will alert operators to corrosion attack and help to avoid hazards through early detection and correction. Author (CISTI)

N92-11992*# Lockheed Engineering and Sciences Co., Hampton, VA.
A COMPARATIVE ANALYSIS OF XV-15 TILTROTOR HOVER TEST DATA AND WOPWOP PREDICTIONS INCORPORATING THE FOUNTAIN EFFECT
Charles K. Rutledge, Charles D. Coffen, and Albert R. George (Cornell Univ., Ithaca, NY.) [1991] 20 p
(Contract NAS1-19000; NAG2-554)
(NASA-CR-189455; NAS 1.26:189455) Avail: NTIS HC/MF A03 CSCL 01C

Acoustic measurements from a hovering full scale XV-15 tilt rotor with the advanced technology blades are presented which show the directionality of fountain effect noise. Predicted acoustic directivity results are also presented which show agreement with the measured data. The aeroacoustic code, WOPWOP, was used in conjunction with a mathematical model which simulated the fountain recirculation aerodynamic effect on the rotor blade surface pressures. The predictions were used to identify the spike character in the measured data as fountain effect associated noise. The directivity of the fountain effect noise was observed to be dominant at the rear of the aircraft with increased intensities 45 degrees below the rotor disk planes. Author

N92-11993# Aeronautical Research Inst. of Sweden, Stockholm. Aerodynamics Dept.
PERFORMANCE IMPROVEMENTS AND FUEL COST SAVINGS DUE TO LEADING EDGE MODIFICATION OF A VINTAGE DELTA WING JET FIGHTER
Sven-Olof Ridder Apr. 1991 29 p Original contains color illustrations
(Contract FMV-FFL-82260-89-262-73-001)
(FFA-TN-1991-22; ETN-91-90287) Avail: NTIS HC/MF A03

The improved aerodynamic efficiency of the aircraft J35 Draken resulting from simple leading edge modifications is evaluated. The study was carried out using earlier wind tunnel data and the actual data of installed thrust and fuel consumption of the jet engine. Improvements in important performance aspects comparable to what could have been achieved by installing a modern jet engine, but at a fraction (probably less than 5 pct.) of the cost switching to a new engine as achieved. A significant improvement in pitch and roll stability in relation to the characteristics of the original aircraft was also achieved. Apart from the obvious tactical value of upgrading the performance (range, maneuver and external load) there comes the added peacetime benefit of a 25 pct. fuel cost reduction for a given training program. ESA

N92-12534# Naval Air Development Center, Warminster, PA.
AI FOR RPVs, SENSOR DRIVEN AIRBORNE REPLANNER (SDAR), FOR A ROBOTIC AIRCRAFT SENSOR PLATFORM (RASP)
R. M. Williams and J. J. Davidson *In* AGARD, Machine Intelligence for Aerospace Electronic Systems Sep. 1991 6 p (For primary document see N92-12517 03-63)
Copyright Avail: NTIS HC/MF A14; Non-NATO Nationals requests available only from AGARD/Scientific Publications Executive

06 AIRCRAFT INSTRUMENTATION

Includes cockpit and cabin display devices; and flight instruments.

For related information see also *19 Spacecraft Instrumentation* and *35 Instrumentation and Photography.*

N92-11994*# National Aeronautics and Space Administration. Hugh L. Dryden Flight Research Facility, Edwards, CA.
DEVELOPMENT OF A PNEUMATIC HIGH-ANGLE-OF-ATTACK FLUSH AIRDATA SENSING (HI-FADS) SYSTEM
Stephen A. Whitmore Nov. 1991 28 p Presented at the SAE Aerotech 1991 Conference, Long Beach, CA, 23-26 Sep. 1991
(NASA-TM-104241; H-1766; NAS 1.15:104241) Avail: NTIS HC/MF A03 CSCL 01D

A nonintrusive high-angle-of-attack flush airdata sensing system was installed and flight tested in the F-18 High Alpha Research Vehicle. This system consists of a matrix of 25 pressure orifices arranged in concentric circles on the nose of the vehicle to determine angles of attack and sideslip, Mach number, and pressure altitude. During the course of the flight tests, it was determined that satisfactory results could be achieved using a subset of just nine ports. Author

N92-12531# Wright Lab., Wright-Patterson AFB, OH.
PILOT'S ASSOCIATE: EVOLUTION OF A FUNCTIONAL PROTOTYPE
Carl S. Lizza, Sheila B. Banks, and Michael A. Whelan *In* AGARD, Machine Intelligence for Aerospace Electronic Systems Sep. 1991 12 p (For primary document see N92-12517 03-63)
Copyright Avail: NTIS HC/MF A14; Non-NATO Nationals requests available only from AGARD/Scientific Publications Executive

N92-12532# British Aerospace Public Ltd. Co., Preston (England).
DEVELOPMENT OF TACTICAL DECISION AIDS
W. G. Semple *In* AGARD, Machine Intelligence for Aerospace Electronic Systems Sep. 1991 6 p (For primary document see N92-12517 03-63)
Copyright Avail: NTIS HC/MF A14; Non-NATO Nationals requests available only from AGARD/Scientific Publications Executive

N92-12535# Messerschmitt-Boelkow-Blohm G.m.b.H., Munich (Germany, F.R.). Military Aircraft Div.
A THREAT MANAGEMENT SYSTEM
K. Holla and B. Benninghofen *In* AGARD, Machine Intelligence for Aerospace Electronic Systems Sep. 1991 6 p (For primary document see N92-12517 03-63)
Copyright Avail: NTIS HC/MF A14; Non-NATO Nationals requests available only from AGARD/Scientific Publications Executive

N92-12536# Messerschmitt-Boelkow-Blohm G.m.b.H., Munich (Germany, F.R.). Military Aircraft Div.
EXPERT SYSTEM FOR THE TORNADO GROUND-BASED CHECK-OUT SYSTEM
J. Fey, J. Marangos, M. Merx, and W. Mansel *In* AGARD, Machine Intelligence for Aerospace Electronic Systems Sep. 1991 5 p (For primary document see N92-12517 03-63)
Copyright Avail: NTIS HC/MF A14; Non-NATO Nationals requests available only from AGARD/Scientific Publications Executive

N92-12539# Wright Lab., Wright-Patterson AFB, OH.
INTEGRATED COMMUNICATIONS, NAVIGATION, IDENTIFICATION, AVIONICS (ICNIA) EXPERT SYSTEM FOR FAULT TOLERANT AVIONICS
Mark E. Minges *In* AGARD, Machine Intelligence for Aerospace Electronic Systems Sep. 1991 15 p (For primary document see N92-12517 03-63)
Copyright Avail: NTIS HC/MF A14; Non-NATO Nationals requests available only from AGARD/Scientific Publications Executive

N92-12540# Wright Lab., Wright-Patterson AFB, OH.
A DEVELOPMENT-MEMORY APPROACH FOR ENHANCING AVIONICS SOFTWARE LOGISTICS

Marc J. Pitarys *In* AGARD, Machine Intelligence for Aerospace Electronic Systems Sep. 1991 5 p (For primary document see N92-12517 03-63)
Copyright Avail: NTIS HC/MF A14; Non-NATO Nationals requests available only from AGARD/Scientific Publications Executive

07 AIRCRAFT PROPULSION AND POWER

Includes prime propulsion systems and systems components, e.g., gas turbine engines and compressors; and onboard auxilliary power plants for aircraft.

For related information see also *20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *44 Energy Production and Conversion.*

N92-11995*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, OH.
THE DESIGN AND PERFORMANCE ESTIMATES FOR THE PROPULSION MODULE FOR THE BOOSTER OF A TSTO VEHICLE
Christopher A. Snyder and Jaime J. Maldonado Oct. 1991 14 p Presented at the Aircraft Design Systems and Operations Meeting, Baltimore, MD, 23-25 Sep. 1991; sponsored by AIAA, AHS, and ASEE Previously announced in IAA as A91-54054
(NASA-TM-105299; E-6642; NAS 1.15:105299; AIAA-91-3136)
Copyright Avail: NTIS HC/MF A03 CSCL 21E

A NASA study of the propulsion systems for possible low-risk replacements for the Space Shuttle is presented. Results of preliminary studies to define the USAF two-stage-to-orbit (TSTO) concept to deliver 10,000 pounds to low polar orbit are described. The booster engine module consists of an over/under turbine bypass engines/ramjet engine design for acceleration from takeoff to the staging point of Mach 6.5 and approximately 100,000 feet altitude. Propulsion system performance and weight are presented with preliminary mission study results of vehicle size. Author

N92-11996# Toronto Univ. (Ontario). Inst. for Aerospace Studies.
AN EXPERIMENTAL AND COMPUTATIONAL INVESTIGATION OF AN ANNULAR REVERSE-FLOW COMBUSTOR
T. C. J. Hu, R. A. Cusworth, and J. P. Sislian Nov. 1990 280 p Sponsored in part by National Science and Engineering Research Council
(UTIAS-338; ISSN-0082-5255; CTN-91-60253) Avail: NTIS HC/MF A13

The complex flowfield of a Pratt and Whitney Canada toroidal vortex annular reverse flow sector combustor was investigated. The longitudinal or instantaneous velocity and transverse velocity components of the mean velocity and the corresponding turbulence intensities (mean longitudinal stress, mean transverse stress and mean shear stress) were mapped in detail for cold flow with and without fuel injection and hot flow conditions, with a two component argon-ion laser Doppler velocimeter (LDV) operated in dual beam, forward scatter mode. The flowfield characteristics were identified from the LDV data and the flow visualization pictures substantiated the findings. Effects of heat addition on the flowfield were determined from comparisons of the cold and hot flows. Results show that combustion intensifies vortical and recirculating flows, increases the momentum of the fuel jet, locally laminarizes the fuel jet near the injector inlet, and increases the turbulence kinetic energy and turbulent stresses at the shear layers. The combustor aerodynamic developments in the flowfield with and without fuel injection are discussed. Predictions of the cold flow using a 2-D TEACH-type computer code demonstrated that the code can provide qualitative agreement for flow regions which are not strongly 3-D in nature, where a 3-D numerical model is required in resolving all the flow features realistically. Author (CISTI)

N92-11997# National Research Council of Canada, Ottawa (Ontario). Structures and Materials Lab.
NUMERICAL VERIFICATION OF NISA 2 FINITE ELEMENT ANALYSIS OF THE CRACKED 5TH STAGE COMPRESSOR DISC OF J-85 JET ENGINE
J. J. Kacprzynski Sep. 1990 163 p Sponsored in part by Hawkwer Siddeley Canada Ltd.
(Contract FA220787NRC06; IAR Proj. 07335)
(NRC-LTR-ST-1792; CTN-91-60258) Copyright Avail: NTIS HC/MF A08

In practical damage tolerance analyses of jet engines, a simple, reliable, accurate, fast finite element code with good pre- and post-processing capability and with a full 3-D fracture mechanics capability, is required. The general finite element code NISA II and its fracture mechanics module ENDURE are considered as a potential candidate for this kind of analysis. In order to verify the correctness of the code, a novel approach has been adopted. After some initial tests of NISA II, the ABAQUS finite element model of the disc was manually changed to the NISA form. Hence the NISA II model is identical to the ABAQUS model, and it uses the same type of elements. Numbering of nodes and elements are also identical. This provides the opportunity to identify and analyze any discrepancy in the results. A three dimensional finite element analysis of the cracked 5th stage compressor disc of the J-85 jet engine was performed with NISA II, version 89, and compared against two detailed analyses performed with ABAQUS. Second order solid elements were used with wedges at the crack tip. The quarter point middle node location was used to represent the singularity at the crack tip. NISA II produced nearly identical crack opening displacements as ABAQUS. ENDURE, version 90 - NISA II fracture mechanics module, did not allow for a general 3-D fracture mechanics analysis; therefore, the stress intensity factors were calculated with ABAQUS only. CISTI

N92-11998# National Research Council of Canada, Ottawa (Ontario). Engine Lab.
HUMIDITY EFFECTS ON GAS TURBINE PERFORMANCE
W. Grabe and J. Bird Dec. 1988 44 p
(NRC-30241; NRC-TR-Eng-003; CTN-91-60285) Avail: NTIS HC/MF A03

Problems arising from natural moisture in the inlet air of gas turbine engines have been addressed. A study of open literature has identified two separate areas of concern: condensation taking place in the air intake, and performance changes arising from humidity effects on gas properties. A brief review of the elements of moist air was given. It was established that condensation depends on a complex combination of relative humidity, air temperature, inlet Mach number, and residence (dwell) time. Operational limits for humidity have been suggested. Two correction approaches for humidity effects on major engine parameters were investigated, one by Samuels and Gale and the other by Fishbeyn and Pervyshin. The correction factors of the two methods had the same trends and nearly the same magnitude for each parameter. It has been proposed that the correction system by Fishbeyn and Pervyshin be implemented for all gas turbine performance testing. These corrections can be of the order of 0.1 to 0.8 percent for high humidity test conditions. Author (CISTI)

N92-11999# National Research Council of Canada, Ottawa (Ontario). Engine Lab.
PRELIMINARY ANALYSIS OF BASELINE VIBRATION DATA FROM ALLISON T56-A-14FE ENGINE AND REDUCTION GEARBOX
J. M. McDougall, J. Nicks, and G. Krishnappa Dec. 1988 79 p
(NRC-31578; NRC-TR-Eng-013; CTN-91-60298) Copyright Avail: NTIS HC/MF A05

One of the major activities of the National Research Council Canada (NRC) Engine Laboratory is condition monitoring of mechanical components in gas turbine engines by vibration analysis. These components include gears, bearings, shafts, and couplings. Failure of any of these components can be catastrophic, especially in the case of helicopter gearboxes. An Allison T56-A014LFE turbo-prop gas turbine engine is used as the

experimental engine, but the ultimate application is the F404 engine. The program on the T56 engine consists of gathering baseline data to detect component visibility, that is, the ability to discern signals produced by individual bearings and gears from the overall signal picked up by the transducer. This report contains the preliminary analysis on baseline data recorded from the T56-A-14LFE engine. From the results of visibility tests, monitoring locations and methods were selected for each mechanical component. Only the components in the engine (power section) and the power train in the reduction gearbox were monitored. This report describes the monitoring methods, test procedures, and details of the techniques of signal analysis using the Mechanical Systems Diagnostic Analyzer. The signatures of all the gears, with the exception of the compressor extension shaft bevel gear, could be seen. Since all of the bearings were in good condition, their visibility could not be definitively established.

CISTI

N92-12000# National Research Council of Canada, Ottawa (Ontario). Engine Lab.

FUEL FLOW MEASUREMENT IN GAS TURBINE TESTING

W. Grabe Aug. 1988 49 p

(NRC-29808; NRC-TR-Eng-001; CTN-91-60303) Copyright Avail: NTIS HC/MF A03

The accurate measurement of fuel flow constitutes an important part of gas turbine performance assessment. Prompted by an international engine testing program, and the mandate to improve all aspects of gas turbine performance evaluation, the Engine Laboratory of the National Research Council of Canada has critically examined the existing fuel flow measuring methods. The report describes all elements of the fuel flow measuring system in detail, with source documentation wherever possible. Since the laboratory employs turbine flowmeters exclusively, the discourse has been limited to that type of flow establishment. Together with an in-house ballistic flowmeter calibrator, and an up-to-date data acquisition and reduction computer system, the present Engine Laboratory fuel flow measuring system provides gas turbine fuel flow assessment of known accuracy. An error analysis, for normal operating conditions, indicated an uncertainty in corrected fuel flow of minus/plus 75 percent. Recommendations have been made for improvements in some measurement components.

Author (CISTI)

N92-12001# National Research Council of Canada, Ottawa (Ontario). Engine Lab.

A DERIVATION OF GROSS THRUST FOR A SEA-LEVEL JET ENGINE TEST CELL

James D. MacLeod Sep. 1988 78 p

(NRC-30165; NRC-DM-009; CTN-91-60304) Copyright Avail: NTIS HC/MF A05

For accurate, indoor ground-level testing of jet engines, the influence of the test cell on the thrust produced by the engine must be established. The true gross thrust may be derived from the measured scale force, if the aerodynamic conditions inside the test cell are known. The test cell effect may also be quantified using correlation factors determined from comparison of test data taken from indoor facilities, and reference outdoor of free-air test stands. In this report, the influence of the test cell on engine performance is described. The forces measured in a particular indoor test cell are derived, and a comparison of actual test data from an indoor test cell to an outdoor test stand is made. The results show that if all the aerodynamic forces have been accounted for, which in this case require corrections of up to 2 percent, the corrected thrust in an indoor cell is the true gross thrust.

Author (CISTI)

08 AIRCRAFT STABILITY AND CONTROL

Includes aircraft handling qualities; piloting; flight controls; and autopilots.

For related information see also *05 Aircraft Design, Testing and Performance.*

N92-12002*# Draper (Charles Stark) Lab., Inc., Cambridge, MA.

AIR-BREATHING HYPERSONIC VEHICLE GUIDANCE AND CONTROL STUDIES; AN INTERGRATED TRAJECTORY/CONTROL ANALYSIS METHODOLOGY: PHASE 1

Philip D. Hattis and Harvey L. Malchow Sep. 1991 89 p

(Contract NAS1-18565)

(NASA-CR-187623; NAS 1.26:187623) Avail: NTIS HC/MF A05 CSCL 01C

A tool which generates optimal trajectory/control histories in an integrated manner is generically adapted to the treatment of single-stage-to-orbit air-breathing hypersonic vehicles. The methodology is implemented as a two point boundary value problem solution technique. Its use permits an assessment of an entire near-minimum-fuel trajectory and desired control strategy from takeoff to orbit while satisfying physically derived inequality constraints and while achieving efficient propulsive mode phasing. A simpler analysis strategy that partitions the trajectory into several boundary condition matched segments is also included to construct preliminary trajectory and control history representations with less computational burden than is required for the overall flight profile assessment. A demonstration was accomplished using a tabulated example (winged-cone accelerator) vehicle model that is combined with a newly developed multidimensional cubic spline data smoothing routine. A constrained near-fuel-optimal trajectory, imposing a dynamic pressure limit of 1000 psf, was developed from horizontal takeoff to 20,000 ft/sec relative air speed while aiming for a polar orbit. Previously unspecified propulsive discontinuities were located. Flight regimes demanding rapid attitude changes were identified, dictating control effector and closed-loop controller authority was ascertained after evaluating effector use for vehicle trim. Also, inadequacies in vehicle model representations and specific subsystem models with insufficient fidelity were determined based on unusual control characteristics and/or excessive sensitivity to uncertainty. Author

N92-12003# Messerschmitt-Boelkow-Blohm G.m.b.H., Munich (Germany, F.R.). Helicopter Div.

RESONANCE AND CONTROL RESPONSE TESTS USING A CONTROL STIMULATION DRIVE

Hubert Mueller and Alfred Gruenewald 8 Oct. 1990 11 p Presented at the National Technical Specialists Meeting of the American Helicopter Society, Scottsdale, AZ, 8-12 Oct. 1990 Previously announced in IAA as A91-31292

(MBB-UD-0586-90-PUB; ETN-91-90194) Avail: NTIS HC/MF A03

The main functions of the STIMULI system currently used for ground and flight testing of the BO 108 are discussed. The control stimulation device was installed for better performance of ground and flight tests. Many types of collective or cyclic inputs can be chosen in a computer menu. It is possible to select the longitudinal and lateral control signals separately or in combination. Each input is of an accuracy which no pilot can reproduce. Hence ground and flight testing can be performed at a higher level of efficiency. The various applications of computer controlled main rotor inputs are demonstrated. For comparison, helicopter testing done with manual control inputs is also shown. ESA

N92-12004# Royal Aerospace Establishment, Bedford (England).

APPLICATION OF EIGENSTRUCTURE ASSIGNMENT TO THE CONTROL OF POWERED LIFT COMBAT AIRCRAFT

P. R. Smith 19 Feb. 1991 304 p

(RAE-TM-FS-1009; BR302867; ETN-91-90294) Copyright Avail: NTIS HC/MF A14

An examination of the eigenstructure assignment control law design technique, and its application to both a vectored thrust aircraft, and a helicopter example is reported. In reviewing the design method, new insight is shed upon the role of the left eigenvectors, which are shown to determine the nature of the input coupling into a dynamic system. It is concluded that selection of the right eigenvectors alone, as is often shown in the literature, is insufficient to ensure decoupling in the system response. Examination of the frequency domain characteristics of a helicopter example are considered, which allow the controlled aircraft handling qualities to be determined. It is shown that simple dynamic elements in the command path can be used to tune the response when problems in obtaining a sufficienctly high bandwidth are encountered. It is concluded that the method provides a viable approach to aircraft control law design, a chief attraction being the very simple structure of the resulting control laws. ESA

N92-12458# Sener Ingenieria y Sistemas S.A., Madrid (Spain).
A METHODOLOGY FOR SOFTWARE SPECIFICATION AND DEVELOPMENT BASED ON SIMULATION
G. FernandezdelaMora, R. Minguez, S. Khan, and J. R. Villa *In* AGARD, Software for Guidance and Control Sep. 1991 5 p (For primary document see N92-12449 03-61)
Copyright Avail: NTIS HC/MF A11; Non-NATO Nationals requests available only from AGARD/Scientific Publications Executive

N92-12466# Royal Aerospace Establishment, Bedford (England). Flight Systems Dept.
THE DEVELOPMENT OF A REQUIREMENT SPECIFICATION FOR AN EXPERIMENTAL ACTIVE FLIGHT CONTROL SYSTEM FOR A VARIABLE STABILITY HELICOPTER: AN Ada SIMULATION IN JSD
Gareth D. Padfield, Stephen P. Bowater, Roy Bradley, and Alan Moore (LBMS Proprietary Ltd. Co., London, England) *In* AGARD, Software for Guidance and Control Sep. 1991 13 p (For primary document see N92-12449 03-61)
Copyright Avail: NTIS HC/MF A11; Non-NATO Nationals requests available only from AGARD/Scientific Publications Executive

09 RESEARCH AND SUPPORT FACILITIES (AIR)

Includes airports, hangars and runways; aircraft repair and overhaul facilities; wind tunnels; shock tubes; and aircraft engine test stands.

For related information see also *14 Ground Support Systems and Facilities (Space).*

N92-12005# Deutsche Forschungsanstalt fuer Luft- und Raumfahrt, Goettingen (Germany, F.R.). Windtunnels Central Div.
PROCEDURE FOR DETERMINATION OF THREE-DIMENSIONAL WIND TUNNEL WALL INTERFERENCES AND WALL ADAPTATION IN COMPRESSIBLE SUBSONIC FLOW USING MEASURED WALL PRESSURES
Hartmut Holst 1 Mar. 1991 171 p Original language document was announced as N91-23088
(DLR-FB-91-09; DLR-FB-90-46; ISSN-0171-1342; ETN-91-90041)
Avail: NTIS HC/MF A08; DLR, Wissenschaftliches Berichtswesen, VB PL DO, Postfach 90 60 58, 5000 Cologne, Fed. Republic of Germany, HC 60 DM

A method for the determination of three dimensional wind tunnel wall interferences and wall adaptation, valid up to high subsonic Mach numbers, is presented. Green's theorem is applied to the problem of wall interferences in wind tunnels. Data required for the calculation are the velocity components at the boundaries of the test section; the computation of the wall adaptation is performed in a single step. Measurements in an adaptive test section prove that the method can be used for the determination of wall interferences, wall adaptation, and residual interferences. Optimization of slot widths in test sections with longitudinally slotted walls as well as the computation of residual interferences can also be performed using this method. This is demonstrated by computations. The limitations of the method are discussed. ESA

N92-12006# Institut de Mecanique des Fluides de Lille (France).
STUDY OF INTERACTIONS ON ANEMOCLINOMETRIC SENSORS [ETUDE D'INTERACTIONS SUR SONDES ANEMOCLINOMETRIQUES]
M. Pruvost and P. Bailleux 24 Sep. 1990 44 p In FRENCH
(Contract DRET-89-003-03)
(Rept-90/30; ETN-91-90110) Avail: NTIS HC/MF A03

The use of anemoclinometric sensors as measuring tools in wind tunnels is studied. The calibration of such sensors can be thrown off due to close proximity to the walls of the wind tunnel. The inaccuracies induced by these sensor/wall panel interactions can be due to local magnetic fields. Obstructions in the wind tunnel may directly affect the antenna and alter the aerodynamic behavior of the sensor. Pressure gradients within the flow may also affect the sensors. The distortions in the aerodynamic field of wind tunnels which lead to such sensor inaccuracies are studied. ESA

N92-12007*# National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.
COMPUTER PROGRAMS FOR THE CALCULATION OF DUAL STING PITCH AND ROLL ANGLES REQUIRED FOR AN ARTICULATED STING TO OBTAIN ANGLES OF ATTACK AND SIDESLIP ON WIND-TUNNEL MODELS
John B. Peterson, Jr. Oct. 1991 75 p
(NASA-TM-104161; NAS 1.15:104161) Avail: NTIS HC/MF A04 CSCL 14B

Two programs were developed to calculate the pitch and roll position of the conventional sting drive and the pitch of a high angle articulated sting to position a wind tunnel model at the desired angle of attack and sideslip and position the model as near as possible to the centerline of the tunnel. These programs account for the effects of sting offset angles, sting bending angles, and wind-tunnel stream flow angles. In addition, the second program incorporates inputs form on-board accelerometers that measure model pitch and roll with respect to gravity. The programs are presented and a description of the numerical operation of the programs with a definition of the variables used in the programs is given. Author

12 ASTRONAUTICS (GENERAL)

For extraterrestrial exploration see *91 Lunar and Planetary Exploration.*

N92-12008# Nuclear Utility Services, Inc., Gaithersburg, MD.
UPDATE OF ULYSSES FSAR RESULTS USING UPDATED NASA PROBABILITIES
18 May 1990 16 p
(Contract DE-AC01-87NE-32134)
(DE90-012504; DOE/NE-32134/T2) Avail: NTIS HC/MF A03

The mission risk results reported in the Ulysses Final Safety Analysis Report (FSAR) issued on March 14, 1990, were based on initiating accident probabilities the National Aeronautics and Space Administration (NASA) provided to the Department of Energy (DOE) on July 13, 1988. These probabilities were provided in terms of ranges; the geometric mean of these ranges were used in the development and presentation of the results in the FSAR for source terms, radiological consequences and risks. Subsequent to the issuance of the FSAR, DOE received a revised set of probabilities from NASA. These probabilities were presented in terms of distributions for each initiating accident and characterized by a mean and cumulative percentile values. NASA recommended that DOE use the updated probabilities to update the Ulysses FSAR results. Accordingly, at the request of DOE, this letter report has been prepared to evaluate the changes in the Ulysses FSAR results when the updated mean probabilities are used. DOE

N92-12009# European Space Agency, Paris (France).
ECS: SEVENTH YEAR IN ORBIT
D. W. Baston, P. Button, B. Demelenne, K. R. Derbyshire, P. J. Leggett, H. Meier, W. E. Neumann, E. Tilmans, R. Viddeleer, and W. R. Burke, ed. May 1991 30 p Original contains color illustrations
(ESA-BR-74; ISBN-92-9092-075-0; ISSN-0250-1589; ETN-91-90261) Copyright Avail: NTIS HC/MF A03

Experience gained with the European Communications System (ECS) during the seventh year of service in orbit from the beginning of July 1989 to the end of June 1990, is summarized. Appraisals of how various individual satellite systems have performed are given and significant events during the reporting period are identified. ESA

13 ASTRODYNAMICS

Includes powered and free-flight trajectories; and orbital and launching dynamics.

No abstracts in this category.

14 GROUND SUPPORT SYSTEMS AND FACILITIES (SPACE)

Includes launch complexes, research and production facilities; ground support equipment, e.g., mobile transporters; and simulators.

For related information see also *09 Research and Support Facilities (Air).*

N92-12010*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.
CONTROL CENTER TECHNOLOGY CONFERENCE PROCEEDINGS
Aug. 1991 641 p Conference held in Clear Lake, TX, 18-20 Jun. 1991 Sponsored in part by Houston Univ., Clear Lake, TX
(NASA-CP-10081; NAS 1.55:10081) Avail: NTIS HC/MF A99 CSCL 14B

Conference papers and presentations are compiled and cover evolving architectures and technologies applicable to flight control centers. Advances by NASA Centers and the aerospace industry are presented. For individual titles, see N92-12011 through N92-12032.

N92-12011*# Computer Sciences Corp., Lompoc, CA. Network Systems Div.
B-2 AND OTHER CURRENT FLIGHT TEST CONTROL CENTER SYSTEM ARCHITECTURES
Jerry Hill *In* NASA. Johnson Space Center, Control Center Technology Conference Proceedings Aug. 1991 p 1-32 (For primary document see N92-12010 03-14)
Avail: NTIS HC/MF A99 CSCL 14B

The topics covered include the following: (1) telemetry processing independent of source; (2) generic system/software; (3) time homogeneity; (4) low latency networks; (5) distributed processing; (6) all data available to all workstations; and (7) recall of data in real time. Author

N92-12012*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
JPL'S SPACE FLIGHT OPERATIONS CENTER: DEVELOPMENT PROJECT OVERVIEW
M. Ebersole *In* NASA. Johnson Space Center, Control Center Technology Conference Proceedings Aug. 1991 p 33-51 (For primary document see N92-12010 03-14)
Avail: NTIS HC/MF A99 CSCL 14B

The topics are covered in view graph form and include the following: (1) major elements of deep space flight programs; (2) development schedule; (3) primary design goals; (4) Space Flight Operations Center (SFOC) data systems architecture; (5) technical guidelines; (6) SFOC data system functional architecture; (7) typical SFOC node; (8) SFOC components; (9) SFOC software categories; (10) planned subsystem core diagram for Mars observer; (11) SFOC use of public domain/3rd party software; (12) SFOC hardware; (13) SFOC target six mission configuration; and (14) SFOC development status and plans. Author

N92-12013*# National Aeronautics and Space Administration. John F. Kennedy Space Center, Cocoa Beach, FL.
KENNEDY SPACE CENTER LAUNCH PROCESSING SYSTEM (LPS) AND THE TEST CHECKOUT AND MONITORING SYSTEM 2 (TCMS2)
Robert Luken *In* NASA. Johnson Space Center, Control Center Technology Conference Proceedings Aug. 1991 p 53-81 (For primary document see N92-12010 03-14)
Avail: NTIS HC/MF A99 CSCL 14B

The topics are presented in view graph form and include the following: (1) a review of KSC/Launch Processing System (LPS); (2) the status of development efforts; (3) a preview of LPS 2; and (4) lessons learned. Author

N92-12014*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, CA.
NASA AMES-DRYDEN INTEGRATED TEST FACILITY: PRESENTATION OUTLINE
Larry Schilling and Dave Bolen (Computer Sciences Corp., Moffett Field, CA.) *In* NASA. Johnson Space Center, Control Center Technology Conference Proceedings Aug. 1991 p 83-105 (For primary document see N92-12010 03-14)
Avail: NTIS HC/MF A99 CSCL 14B

The topics are presented in view graph form and include the following: (1) a Dryden overview; (2) the Integrated Tests Facility (ITF); (3) the ITF system architecture; (4) the computer aided system testing; and (5) the ITF system video. Author

N92-12015*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.
SPACE SHUTTLE MISSION CONTROL CENTER UPGRADE
Pat Duffin *In its* Control Center Technology Conference Proceedings Aug. 1991 p 125-208 (For primary document see N92-12010 03-14)
Avail: NTIS HC/MF A99 CSCL 14B

The Mission Control Center (MCC) is the facility that provides centralization of all mission operations in support of the shuttle from liftoff through landing. This facility serves as the focal point for real time flight control operations supporting the shuttle, spacelab, and selected payload systems. MCC upgrade accomplishments are as follows: replaced 5 mainframe computers and the associated input/output data interfaces; developed and installed a distributed data system with 81 workstations, 5 LANs, data drivers, and a fiber optic distribution subsystem; developed over 1.5 million lines of code to support new distributed system; developed new digital voice system which provides the MCC capacity to handle th Shuttle programs demands and growth potential to handle Space Station; replaced failing digital TV equipment with digital generation equipment; replaced obsolete center screen projector; and provided the platform for the multiprogram control center. Author

N92-12016*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.
SPACE STATION CONTROL CENTER ARCHITECTURE
Karen Schmalz *In its* Control Center Technology Conference Proceedings Aug. 1991 p 209-235 (For primary document see N92-12010 03-14)
Avail: NTIS HC/MF A99 CSCL 14B

The Space Station control center (SSCC) is under the cognizance of the Johnson Space Center and is located adjacent to the Shuttle's mission control center. Responsibility for design, development, and operations of the control center is the

responsibility of the mission operations directorate at JSC. Space Station Ground Systems Division is responsible for design and development of the control center systems which is currently in process under the mission support contractor team led by Loral Space Information Systems. It is early in the life cycle of the SSCC project. System functional design review was completed. Subsystem requirements are now being developed and reviewed. A new facility will be available for development activities. Author

N92-12017*# Air Force Avionics Lab., Wright-Patterson AFB, OH.

AFSCN COMMAND AND CONTROL SEGMENT EVOLUTION

Larry K. Whipple, Deborah Moorhead, and Roger Fong (Aerospace Corp., El Segundo, CA.) *In* NASA. Johnson Space Center, Control Center Technology Conference Proceedings Aug. 1991 p 237-280 (For primary document see N92-12010 03-14)

Avail: NTIS HC/MF A99 CSCL 14B

An overview is presented of the Air Force Satellite Control Network (AFSCN). The AFSCN is a worldwide network providing DOD satellite control capability including satellite tracking and commanding, telemetry data processing, and communications. The network elements are listed including test center, space operations center, tracking stations, and network engineering and system development. Space Systems Div. responsibilities are given along with A.F. Space Command and Logistics Command responsibilities. Author

N92-12018*# Rockwell International Corp., Downey, CA. Aerospace Simulation and Systems Test Center.

GROUND SUPPORT SYSTEM METHODOLOGY AND ARCHITECTURE

P. D. Schoen *In* NASA. Johnson Space Center, Control Center Technology Conference Proceedings Aug. 1991 p 281-301 (For primary document see N92-12010 03-14)

Avail: NTIS HC/MF A99 CSCL 14B

A synergistic approach to systems test and support is explored. A building block architecture provides transportability of data, procedures, and knowledge. The synergistic approach also lowers cost and risk for life cycle of a program. The determination of design errors at the earliest phase reduces cost of vehicle ownership. Distributed scaleable architecture is based on industry standards maximizing transparency and maintainability. Autonomous control structure provides for distributed and segmented systems. Control of interfaces maximizes compatibility and reuse, reducing long term program cost. Intelligent data management architecture also reduces analysis time and cost (automation). Author

N92-12019*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.

REAL TIME DATA SYSTEM (RTDS)

John F. Muratore *In its* Control Center Technology Conference Proceedings Aug. 1991 p 303-336 (For primary document see N92-12010 03-14)

Avail: NTIS HC/MF A99 CSCL 14B

Lessons learned from operational real time expert systems are examined. The basic system architecture is discussed. An expert system is any software that performs tasks to a standard that would normally require a human expert. An expert system implies knowledge contained in data rather than code. And an expert system implies the use of heuristics as well as algorithms. The 15 top lessons learned by the operation of a real time data system are presented. Author

N92-12020*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

SHARP: SPACECRAFT HEALTH AUTOMATED REASONING PROTOTYPE

David J. Atkinson *In* NASA. Johnson Space Center, Control Center Technology Conference Proceedings Aug. 1991 p 337-361 (For primary document see N92-12010 03-14)

Avail: NTIS HC/MF A99 CSCL 14B

The planetary spacecraft mission OPS as applied to SHARP is studied. Knowledge systems involved in this study are detailed. SHARP development task and Voyager telecom link analysis were examined. It was concluded that artificial intelligence has a proven capability to deliver useful functions in a real time space flight operations environment. SHARP has precipitated major change in acceptance of automation at JPL. The potential payoff from automation using AI is substantial. SHARP, and other AI technology is being transferred into systems in development including mission operations automation, science data systems, and infrastructure applications. Author

N92-12021*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, CA.

PLANNING SYSTEMS FOR PIONEER MISSION CONTROL

Marcie Smith *In* NASA. Johnson Space Center, Control Center Technology Conference Proceedings Aug. 1991 p 363-379 (For primary document see N92-12010 03-14)

Avail: NTIS HC/MF A99 CSCL 14B

Information on planning systems for Pioneer Mission control is given in viewgraph form. Information is given on flight operations, planning procedures, operation of the spacecraft past the original design scope, the Pioneer Venus Orbiter expert system, and planning future long-term missions. Author

N92-12022*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

AUTOMATION FOR DEEP SPACE VEHICLE MONITORING

Ursula M. Schwuttke *In* NASA. Johnson Space Center, Control Center Technology Conference Proceedings Aug. 1991 p 381-400 (For primary document see N92-12010 03-14)

Avail: NTIS HC/MF A99 CSCL 14B

Information on automation for deep space vehicle monitoring is given in viewgraph form. Information is given on automation goals and strategy; the Monitor Analyzer of Real-time Voyager Engineering Link (MARVEL); intelligent input data management; decision theory for making tradeoffs; dynamic tradeoff evaluation; evaluation of anomaly detection results; evaluation of data management methods; system level analysis with cooperating expert systems; the distributed architecture of multiple expert systems; and event driven response. Author

N92-12023*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, MD.

CONTROL CENTER OPERATIONS AT THE GODDARD SPACE FLIGHT CENTER

Robert M. Connerton *In* NASA. Johnson Space Center, Control Center Technology Conference Proceedings Aug. 1991 p 401-422 (For primary document see N92-12010 03-14)

Avail: NTIS HC/MF A99 CSCL 14B

Information is given in viewgraph form on control center operations at the Goddard Space Flight Center. Information is given on multi-mission, dedicated and attached payload support; the mission operations environment; technical challenges; Hubble Space Telescope (HST) science planning interface; operations engineering life cycle; Special Analysis of Maneuverable Satellites (SAMS) operations; and user interface applications. Author

N92-12024*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, AL.

HUNTSVILLE OPERATIONS SUPPORT CENTER

Darrell G. Bailey *In* NASA. Johnson Space Center, Control Center Technology Conference Proceedings Aug. 1991 p 423-442 (For primary document see N92-12010 03-14)

Avail: NTIS HC/MF A99 CSCL 14B

Information is given in viewgraph form on the Huntsville Operations Support Center (HOSC). The HOSC is a multi-mission control and support facility designed to provide simultaneous support to several diverse missions, using a common set of processing equipment and facilities. Information is given on the missions supported by the HOSC; facility layout; generic system goals; HOSC existing computer architecture; current mission requirements; currently employed hardware and software; front end

processing; central processing; peripheral processors; audio and video communications; and upgrading plans. Author

N92-12025*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.
REAL TIME DATA SYSTEM (RTDS)
Troy A. Heindel *In its* Control Center Technology Conference Proceedings Aug. 1991 p 443-465 (For primary document see N92-12010 03-14)
Avail: NTIS HC/MF A99 CSCL 14B

Information is given in viewgraph form on the Real Time Data System (RTDS). The goals are to increase the quality of flight decision making, reduce and enhance flight controller training time, and serve as a near-operations technology test-bed. Information is given on the growth of RTDS; flight control disciplines; RTDS technology deployment in 1987-1989 and 1990-91; a functionality comparison of mainframes and workstations; and technology transfer activities. Author

N92-12026*# Colorado Univ., Boulder.
LESSONS LEARNED IN CONTROL CENTER TECHNOLOGIES AND NON-TECHNOLOGIES
Elaine R. Hansen *In* NASA. Johnson Space Center, Control Center Technology Conference Proceedings Aug. 1991 p 467-492 (For primary document see N92-12010 03-14)
Avail: NTIS HC/MF A99 CSCL 14B

Information is given in viewgraph form on the Solar Mesosphere Explorer (SME) Control Center and the Oculometer and Automated Space Interface System (OASIS). Topics covered include SME mission operations functions; technical and non-technical features of the SME control center; general tasks and objects within the Space Station Freedom (SSF) ground system nodes; OASIS-Real Time for the control and monitoring of of space systems and subsystems; and OASIS planning, scheduling, and PC architecture. Author

N92-12027*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.
MacSPOC: ORBITAL TRAJECTORY CALCULATIONS ON A LAPTOP COMPUTER
Dan Adamo *In its* Control Center Technology Conference Proceedings Aug. 1991 p 493-503 (For primary document see N92-12010 03-14)
Avail: NTIS HC/MF A99 CSCL 14B

Orbital trajectory calculations on a laptop computer are presented in the form of the viewgraphs. The following subject areas are covered: laptop computing in the Space Shuttle program; current laptop prototyping with MacSPOC; future laptop applications; and summary. Author

N92-12028*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, MD.
ADVANCED TECHNOLOGIES FOR MISSION CONTROL CENTERS
John T. Dalton and Peter M. Hughes *In* NASA. Johnson Space Center, Control Center Technology Conference Proceedings Aug. 1991 p 505-548 (For primary document see N92-12010 03-14)
Avail: NTIS HC/MF A99 CSCL 14B

Advance technologies for Mission Control Centers are presented in the form of the viewgraphs. The following subject areas are covered: technology needs; current technology efforts at GSFC (human-machine interface development, object oriented software development, expert systems, knowledge-based software engineering environments, and high performance VLSI telemetry systems); and test beds. Author

N92-12029*# Science Applications International Corp., San Diego, CA.
ADVANCED LAPTOP AND SMALL PERSONAL COMPUTER TECHNOLOGY
Roger L. Johnson *In* NASA. Johnson Space Center, Control Center Technology Conference Proceedings Aug. 1991 p 549-588 (For primary document see N92-12010 03-14)
Avail: NTIS HC/MF A99 CSCL 14B

Advanced laptop and small personal computer technology is presented in the form of the viewgraphs. The following areas of hand carried computers and mobile workstation technology are covered: background, applications, high end products, technology trends, requirements for the Control Center application, and recommendations for the future. Author

N92-12030*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.
MOD CONTROL CENTER AUTOMATED INFORMATION SYSTEMS SECURITY EVOLUTION
Rich Owen *In its* Control Center Technology Conference Proceedings Aug. 1991 p 589-613 (For primary document see N92-12010 03-14)
Avail: NTIS HC/MF A99 CSCL 14B

The role of the technology infusion process in future Control Center Automated Information Systems (AIS) is highlighted. The following subject areas are presented in the form of the viewgraphs: goals, background, threat, MOD's AISS program, TQM, SDLC integration, payback, future challenges, and bottom line. Author

N92-12031*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, CA.
MISSION CRITICAL TECHNOLOGY DEVELOPMENT
Nancy Sliwa *In* NASA. Johnson Space Center, Control Center Technology Conference Proceedings Aug. 1991 p 615-634 (For primary document see N92-12010 03-14)
Avail: NTIS HC/MF A99 CSCL 14B

Mission critical technology development is presented in the form of the viewgraphs. The following subject areas are covered: organization/philosophy overview; fault management technology; and introduction to optical processing. Author

N92-12032*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, CA.
FUTURE APPLICATIONS OF ARTIFICIAL INTELLIGENCE TO MISSION CONTROL CENTERS
Peter Friedland *In* NASA. Johnson Space Center, Control Center Technology Conference Proceedings Aug. 1991 p 635-647 (For primary document see N92-12010 03-14)
Avail: NTIS HC/MF A99 CSCL 14B

Future applications of artificial intelligence to Mission Control Centers are presented in the form of the viewgraphs. The following subject areas are covered: basic objectives of the NASA-wide AI program; inhouse research program; constraint-based scheduling; learning and performance improvement for scheduling; GEMPLAN multi-agent planner; planning, scheduling, and control; Bayesian learning; efficient learning algorithms; ICARUS (an integrated architecture for learning); design knowledge acquisition and retention; computer-integrated documentation; and some speculation on future applications. Author

N92-12033*# Research Inst. for Advanced Computer Science, Moffett Field, CA.
AMES LIFE SCIENCE TELESCIENCE TESTBED EVALUATION
Richard F. Haines, Vicki Johnson, Kristofer H. Vogelsong, and Walt Froloff (Lockheed Engineering and Sciences Co., Moffett Field, CA.) Jul. 1989 36 p
(Contract NASw-4234)
(NASA-CR-188856; NAS 1.26:188856; RIACS-TR-89-31) Avail: NTIS HC/MF A03 CSCL 14B

Eight surrogate spaceflight mission specialists participated in a real-time evaluation of remote coaching using the Ames Life Science Telescience Testbed facility. This facility consisted of three remotely located nodes: (1) a prototype Space Station glovebox; (2) a ground control station; and (3) a principal investigator's (PI) work area. The major objective of this project was to evaluate the effectiveness of telescience techniques and hardware to support three realistic remote coaching science procedures: plant seed germinator charging, plant sample acquisition and preservation,

and remote plant observation with ground coaching. Each scenario was performed by a subject acting as flight mission specialist, interacting with a payload operations manager and a principal investigator expert. All three groups were physically isolated from each other yet linked by duplex audio and color video communication channels and networked computer workstations. Workload ratings were made by the flight and ground crewpersons immediately after completing their assigned tasks. Time to complete each scientific procedural step was recorded automatically. Two expert observers also made performance ratings and various error assessments. The results are presented and discussed. Author

N92-12034# Messerschmitt-Boelkow-Blohm G.m.b.H., Munich (Germany, F.R.). Berichtsstelle.
LAUNCH SITE OPERATIONS FOR COLUMBUS FREE FLYER AND RESUPPLY MISSION
Horst Michaelis, Klausdieter Fugel, and Harald Schmidt-Gerstmeyer (Erno Raumfahrttechnik G.m.b.H. Bremen, Germany, F.R.) 1991 8 p Presented at the AAAF/DGLR/RAeS International Conference: Launch Bases and Control Infrastructures for Spacecraft, Paris, France, 13-16 May 1991
(MBB-UO-0153-91-PUB; OTN-018406; ETN-91-90191) Avail: NTIS HC/MF A02

The Columbus Free Flying Laboratory (MTFF) and subsequent resupply performed by Hermes will be launched from CSG (French acronym for French Guyana Space Station) with Ariane 5. Launch site operations for the initial MTFF launch include among others transportation and receiving activities, MTFF servicing, checkout, mating of MTFF to Ariane 5 and interface verification. These operations also include a data end to end test involving the in orbit infrastructure ground segment for flight operations in Europe, the DRS, ESA Earth terminals, IGS and manned space laboratories flight control center to verify all nominal and backup communication links and ascertain the final configuration and readiness of the involved space elements and ground facilities. The MTFF resupply missions are processed differently and follow mainly the Hermes preparation flow with integration of payload in Europe, transport to CSG, Hermes processing in the Hermes integration building in Kourou and final assembly building. ESA

N92-12035*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
ENVIRONMENTAL PROJECTS. VOLUME 13: UNDERGROUND STORAGE TANKS, REMOVAL AND REPLACEMENT. GOLDSTONE DEEP SPACE COMMUNICATIONS COMPLEX
Irv Bengelsdorf 15 Feb. 1991 175 p
(Contract NAS7-918)
(NASA-CR-189030; JPL-Publ-87-4-Vol-13; NAS 1.26:189030)
Avail: NTIS HC/MF A08 CSCL 14B

The Goldstone Deep Space Communications Complex (GDSCC), located in the Mojave Desert about 40 miles north of Barstow, California, and about 160 miles northeast of Pasadena, is part of the National Aeronautics and Space Administration's (NASA's) Deep Space Network, one of the world's largest and most sensitive scientific telecommunications and radio navigation networks. Activities at the GDSCC are carried out in support of six large parabolic dish antennas. As a large-scale facility located in a remote, isolated desert region, the GDSCC operations require numerous on-site storage facilities for gasoline, diesel oil, hydraulic oil, and waste oil. These fluids are stored in underground storage tanks (USTs). This present volume describes what happened to the 26 USTs that remained at the GDSCC. Twenty-four of these USTs were constructed of carbon steel without any coating for corrosion protection, and without secondary containment or leak detection. Two remaining USTs were constructed of fiberglass-coated carbon steel but without secondary containment or leak protection. Of the 26 USTs that remained at the GDSCC, 23 were cleaned, removed from the ground, cut up, and hauled away from the GDSCC for environmentally acceptable disposal. Three USTs were permanently closed (abandoned in place).
Author

N92-12049*# National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.
CARS TEMPERATURE MEASUREMENTS IN A HYPERSONIC PROPULSION TEST FACILITY
Olin Jarrett, Jr., M. W. Smith, R. R. Antcliff, G. Burt Northam, A. D. Cutler, D. P. Capriotti, and D. J. Taylor (Los Alamos National Lab., NM.) *In* JHU, The 27th JANNAF Combustion Subcommittee Meeting, Volume 1 Nov. 1990 p 565-573 (For primary document see N92-12048 03-20)
Avail: NTIS HC/MF A99 CSCL 14B

N92-12824*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
GOLDSTONE SOLAR SYSTEM RADAR
Raymond F. Jurgens *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 69 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 14B

15 LAUNCH VEHICLES AND SPACE VEHICLES

Includes boosters; operating problems of launch/space vehicle systems; and reusable vehicles.

For related information see also *20 Spacecraft Propulsion and Power.*

N92-12036# Sandia National Labs., Albuquerque, NM.
HYPERVELOCITY EXPLOSIVE LAUNCHERS
H. C. Pujols 20 Mar. 1990 17 p Presented at the Aeroballistic Range Association Meeting, Paris, France, 24-28 Sep. 1989
(Contract DE-AC04-76DP-00789)
(DE90-011713; ALS/TR-90-006; CONF-8909229-3) Avail: NTIS HC/MF A03

This publication describes a number of hypervelocity launchers which use plane waves initiated by cylindrical charges of high explosive. Peak projectile velocities achievable with a single thruster stage range up to 7000 m/sec. Higher peak projectile velocities have been achieved with multistage launchers. Theoretically, projectile velocities are limited only by the maximum usable explosive mass of the first stage. DOE

16 SPACE TRANSPORTATION

Includes passenger and cargo space transportation, e.g., shuttle operations; and space rescue techniques.

For related information see also *03 Air Transportation and Safety* and *18 Spacecraft Design, Testing and Performance.* For space suits see *54 Man/System Technology and Life Support.*

No abstracts in this category.

17 SPACE COMM., SPACECRAFT COMM., COMMAND & TRACKING

Includes telemetry; space communications networks; astronavigation and guidance; and radio blackout.

For related information see also *04 Aircraft Communications and Navigation* and *32 Communications and Radar.*

N92-12037# Midwest Research Inst., Golden, CO.
A PC-BASED TELEMETRY SYSTEM FOR ACQUIRING AND REDUCING DATA FROM MULTIPLE PCM STREAMS
D. A. Simms and C. P. Butterfield Jul. 1991 11 p Presented at the International Telemetering Conference, Las Vegas, NV, 4 Nov. 1991

(Contract DE-AC02-83CH-10093)
(DE91-002199; SERI/TP-257-4123; CONF-911187-1) Avail: NTIS HC/MF A03

The Solar Energy Research Institute's (SERI) Wind Research Program is using Pulse Code Modulation (PCM) Telemetry Data-Acquisition Systems to study horizontal-axis wind turbines. Many PCM systems are combined for use in test installations that require accurate measurements from a variety of different locations. SERI has found them ideal for data-acquisition from multiple wind turbines and meteorological towers in wind parks. A major problem has been in providing the capability to quickly combine and examine incoming data from multiple PCM sources in the field. To solve this problem, SERI has developed a low-cost PC-based PCM Telemetry Data-Reduction System (PC-PCM System) to facilitate quick, in-the-field multiple-channel data analysis. The PC-PCM System consists of two basic components. First, PC-compatible hardware boards are used to decode and combine multiple PCM data streams. Up to four hardware boards can be installed in a single PC, which provides the capability to combine data from four PCM streams directly to PC disk or memory. Each stream can have up to 62 data channels. Second, a software package written for use under DOS was developed to simplify data-acquisition control and management. The software, called the Quick-Look Data Management Program, provides a quick, easy-to-use interface between the PC and multiple PCM data streams. The Quick-Look Data Management Program is a comprehensive menu-driven package used to organize, acquire, process, and display information from incoming PCM data streams. The paper describes both hardware and software aspects of the SERI PC-PCM system, concentrating on features that make it useful in an experiment test environment to quickly examine and verify incoming data from multiple PCM streams. Also discussed are problems and techniques associated with PC-based telemetry data-acquisition, processing, and real-time display. DOE

N92-12456# Office National d'Etudes et de Recherches Aerospatiales, Toulouse (France). GRECO Informatique.
FORMAL SPECIFICATION OF SATELLITE TELEMETRY: A PRACTICAL EXPERIENCE
Jean-Michel Hufflen and Michel Lemoine *In* AGARD, Software for Guidance and Control Sep. 1991 9 p Sponsored in part by IMAG/LIFIA, Grenoble, France; and ONERA-CERT/DERI, Toulouse, France (For primary document see N92-12449 03-61)
Copyright Avail: NTIS HC/MF A11; Non-NATO Nationals requests available only from AGARD/Scientific Publications Executive

18 SPACECRAFT DESIGN, TESTING AND PERFORMANCE

Includes satellites; space platforms; space stations; spacecraft systems and components such as thermal and environmental controls; and attitude controls.

For life support systems see *54 Man/System Technology and Life Support.* For related information see also *05 Aircraft Design, Testing and Performance, 39 Structural Mechanics,* and *16 Space Transportation.*

N92-12038# Lawrence Livermore National Lab., CA.
HIERARCHICAL CONTROLLED COMPONENT SYNTHESIS OF LARGE SPACE STRUCTURES
K. D. Young 1990 12 p Presented at the 11th International Federation of Automatic Control (IFAC) World Congress Conference, Tallinn, USSR, 13-17 Aug. 1990
(Contract W-7405-eng-48)
(DE90-013476; UCRL-101639; CONF-9008118-1) Avail: NTIS HC/MF A03

This paper describes a new framework called Controlled Component Synthesis for the design of multi-level decentralized for large flexible structures. In contrast to the existing decentralized control approach in which the design begins with a given dynamic model of the flexible structure, controlled components are built and assembled into a controlled flexible structure that meets performance specifications. A simple truss structural control problem is employed to illustrate the design procedures, as well as demonstrate the potentials of the developed method for controlling very large dimensional truss structures. DOE

N92-12039# Interagency Nuclear Safety Review Panel.
UNCERTAINTY ANALYSIS REPORT FOR ULYSSES, VOLUME 1
M. V. Frank (Safety Factors Associates, Encinitas, CA.) Jul. 1990 11 p Sponsored by DOE
(DE91-013476; INSRP-90-07-Vol-1) Avail: NTIS HC/MF A03

This volume provides comments related to the Final Safety Analysis Report (FSAR) integrated risk analysis. The review encompassed the risk analysis aspects of the following FSAR sections: Executive Summary; Volume 3, Book 1, all sections; and Volume 3, Book 2, Appendices A, B, and D. The review also included a May 23, 1990, letter from James A. Turi of the Department of Energy (DOE) to Dudley G. McConnell of NASA. DOE

N92-12040# Interagency Nuclear Safety Review Panel.
SAFETY EVALUATION REPORT FOR ULYSSES, VOLUME 2
Sep. 1990 102 p Sponsored by DOE
(DE91-013475; INSRP-90-01-Vol-2) Avail: NTIS HC/MF A06

This report provides a brief overview of the various activities and judgments that were made by the Interagency Nuclear Safety Review Panel (INSRP) coordinators during the development of the Safety Evaluation Report (SER) for the Ulysses mission. Each INSRP subpanel has generated a report describing its activities and the results of its portion of the Ulysses evaluation. These reports should be reviewed for an indepth understanding of the subpanel activities. To ensure continuity between the subpanel reports and the SER, this report summarizes the considerations and judgments made by the INSRP coordinators at various points during the evaluation process. In particular, this report identifies the specific INSRP requested changes made to the Launch Accident Scenario Evaluation Program, Version 3 (LASEP3) and other computer models used by the Department of Energy (DOE) in the development of Volumes 2 and 3 of the Ulysses Final Safety Analysis Report (FSAR) to support the INSRP in the development of the SER. In addition, this report documents judgments and calculations made with respect to the presentation of results for the INSRP evaluation. DOE

N92-12041 California Univ., San Diego.
A DIFFERENTIAL CHARGING MODEL FOR SYNCHRONOUS SATELLITES Ph.D. Thesis
Wei-wei Li 1990 159 p
Avail: Univ. Microfilms Order No. DA9118988

A semi-analytic model was developed for differential charging of satellites. The model applies to a plasma whose free path is much greater than Debye Length is much greater than the size of the satellite. The potential of a barrier free surface is solved from the local charging current. On surfaces under barriers, the potentials are regulated by the self-consistency between barriers and the net charging current. When the potential under the barrier goes more positive, the barrier height increases. On other hand, a stronger barrier suppresses more outgoing electrons so that net current become more negative. When the a negative charge accumulates on the surface, the barrier would decrease. These two opposite tendencies are balanced if the barrier height reaches an appropriate value. After the potential on the barrier free surfaces and barrier structures are determined, the complete potential contours around a satellite can be solved. The differential potential can be separated into a normalized potential and a scale factor. The scale factor is the most negative potential on the barrier free surface which includes all the information about ambient plasma, time, and material. The normalized potential shows the ratio between the potential at any given location and the most negative potential. It indicates the relative differential charging which is an intrinsic property of the geometry. Dissert. Abstr.

N92-12042# Toronto Univ. (Ontario). Inst. for Aerospace Studies.
OPTIMAL CONTROL OF LARGE SPACE STRUCTURES USING DISTRIBUTED GYRICITY: A CONTINUUM APPROACH
Christopher John Damaren Oct. 1990 105 p
(UTIAS-341; ISSN-0082-5255; CTN-91-60252) Avail: NTIS HC/MF A06

Continuum modeling is used for the analysis of large space structures (LSS) that employ a collection of control moment gyros (CMG's) for vibration control. The structure is modeled as a continuum in mass, stiffness, and gyricity (stored angular momentum) which is an effective model for lattice structures containing several small CMG's. A viscous damping model completes the dynamical description. In this model, a system of control moment gyros is replaced with the gyricity distribution (the density of stored angular momentum) and its associated distribution of gimbal angles. Point CMG's and the distributed analog are treated within the same framework. The latter description is interpreted as the limit of a sequence of point gyros. A first-order perturbation approach is presented for determining the changes in the modal characteristics due to light damping. The completeness properties of the damped, gyroelastic eigenfunctions are established, which permits the damped modal equations of motion to be derived. The introduction of an appropriate adjoint equation, which occurs naturally in optimal control problems, is instrumental in the analysis. Controllability and observability conditions for this class of structural model are found in terms of the modal information (frequencies and mode shapes). Author (CISTI)

N92-12043# Messerschmitt-Boelkow-Blohm G.m.b.H., Munich (Germany, F.R.). Berichtsstelle
MTFF OPERATIONS
Helmut Luttmann (Erno Raumfahrttechnik G.m.b.H. Bremen, Germany, F.R.) 1991 134 p Presented at Space Courses on Low Earth Orbit Transportation and Orbital Systems, Aachen, Fed. Republic of Germany, 18 Feb. - 3 Mar. 1991
(MBB-UO-0075-91-PUB; OTN-033127; ETN-91-90189) Avail: NTIS HC/MF A07

The operational implications and the proposed concepts for the various flight phases of the Columbus Man Tended Free Flyer (MTFF) are described. For the different operational phase, the operational concepts, the different levels of monitoring and control as well as the related degree of autonomy and involvement and authorities of ground and flight crew are described. For the normal operations phase the following are described: the overall command and control concept of the MTFF, the generic software organizations, the implementation of the operation concepts using mastertimeline, operational tasks, actions, etc., the execution principles, resource management and fault management. Short descriptions of the prelaunch ground processing, the launch phase and the initial activation phase are given. The servicing activities are described for the servicing execution. ESA

N92-12044# Messerschmitt-Boelkow-Blohm G.m.b.H., Munich (Germany, F.R.). Berichtsstelle.
THE COLUMBUS FREE FLYING LABORATORY: MECHANICAL DESIGN ASPECTS
Joachim Guelpin (Erno Raumfahrttechnik G.m.b.H. Bremen, Germany, F.R.) 1991 10 p Presented at the ESA/ESTEC International Conference on Spacecraft Structure and Mechanical Testing, Noordwijk, Netherlands, 24-26 Apr. 1991
(MBB-UO-0152-91-PUB; OTN-016407; ETN-91-90190) Avail: NTIS HC/MF A02

The Columbus Free Flyer has a 30 year mission in low Earth orbit with the primary objective to provide microgravity laboratory capabilities. The particular mechanical requirements resulting from the mission are explained. The relevant design features are presented and the verification approach envisaged in the development program which shall lead to a launch of the laboratory in 2001 is outlined. ESA

N92-12045*# National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.
THERMAL DESIGN AND TEST RESULTS FOR SUNLITE ULTRA-STABLE REFERENCE CAVITY
Ruth M. Amundsen Aug. 1991 18 p
(NASA-TM-104117; NAS 1.15:104117) Avail: NTIS HC/MF A03 CSCL 20E

SUNLITE (Stanford University-NASA Laser In-Space Technology Experiment) is a space-based experiment which uses a reference cavity to provide a stable frequency reference for a terahertz laser oscillator. Thermal stability of the cavity is a key factor in attaining a stable narrow-linewidth laser beam. The mount which is used to support and align the cavity will provide thermal isolation from the environment. The baseline requirement for thermal stability of the cavity is 0.025 C/min, but the design is directed toward achieving stability well beyond this requirement to improve the science data gained. A prototype of the cavity mount was fabricated and tested to characterize the thermal performance. The thermal vacuum test involved stable high-resolution temperature measurements and stable baseplate temperature control over long durations. Based on test data, the cavity mount design satisfies the severe requirement for the cavity thermal stability. Author

N92-12046*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.
ATOMIC OXYGEN INTERACTION WITH SPACECRAFT MATERIALS: RELATIONSHIP BETWEEN ORBITAL AND GROUND-BASED TESTING FOR MATERIALS CERTIFICATION
J. B. Cross, S. L. Koontz, and E. H. Lan (McDonnell-Douglas Space Systems Co., Huntington Beach, CA.) 1991 17 p Presented at the 5th International Symposium on Materials in Space Environment, Cannes, France, 16-20 Sep. 1991
(Contract W-7405-eng-36)
(NASA-TM-105449; NAS 1.15:105449; DE92-000190; LA-UR-91-3052; CONF-9109285-1) Avail: NTIS HC/MF A03 CSCL 22B

The effects of atomic oxygen on boron nitride, silicon nitride, solar cell interconnects used on the Intelsat 6 satellite, organic polymers, and MoS2 and WS2 dry lubricant have been studied in low Earth orbit (LEO) flight experiments and in our ground-based simulation facility at Los Alamos National Laboratory. Both the in-flight and ground-based experiments employed in situ electrical resistance measurements to detect penetration of atomic oxygen through materials and ESCA analysis to measure chemical composition changes. In the presence of atomic ozygen, silver oxidizes to form silver oxide, which has a much higher electrical resistance than pure silver. Permeation of atomic oxygen through BN overcoated on thin silver was observed. No permeation of atomic oxygen through Si3N4 was observed. Test results on the Intelsat 6 satellite interconnects used on its photovoltaic array indicate that more than 60-80 percent of the original thickness of silver should remain after completion of the proposed Space Shuttle rescue/reboost mission. Gas phase reaction products produced by the interaction of high kinetic energy atomic oxygen (AO) with Kapton were found to be H2, H2O, CO, and CO2 with NO being a possible secondary product. Hydrogen abstraction at high AO kinetic energy is postulated to be the key reaction controlling the erosion rate of Kapton. An Arrhenius-like expression having an activation barrier of 0.4 eV can be fit to the data, which suggests that the rate limiting step in the AO/Kapton reaction mechanism can be overcome by translational energy. Oxidation of MoS2 and WS2 dry lubricants in both ground-based and orbital exposures indicated the formation of MoO3 and WO3 respectively. A protective oxide layer is formed approximately 30 monolayers thick which has a high initial friction coefficient until the layer is worn off. DOE

N92-12521# Aerospace Corp., Sunnyvale, CA.
ADVANCED SATELLITE WORKSTATION (ASW)
T. E. Bleier, S. Hollander, and S. Sutton *In* AGARD, Machine Intelligence for Aerospace Electronic Systems Sep. 1991 8 p

(For primary document see N92-12517 03-63)
Copyright Avail: NTIS HC/MF A14; Non-NATO Nationals requests available only from AGARD/Scientific Publications Executive

N92-12927*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, CA.
IMAGING ANALYSIS OF LDEF CRATERS Abstract Only
F. RadicatidiBrozolo, D. W. Harris, J. A. Chakel, R. H. Fleming (Evans, Charles and Associates, Redwood City, CA), and T. E. Bunch *In* Lunar and Planetary Inst., Abstracts for the 54th Annual Meeting of the Meteoritical Society 1991 p 194 (For primary document see N92-12901 03-90)
Avail: NTIS HC/MF A14 CSCL 03B

19 SPACECRAFT INSTRUMENTATION

For related information see also *06 Aircraft Instrumentation* and *35 Instrumentation and Photography.*

No abstracts in this category.

20 SPACECRAFT PROPULSION AND POWER

Includes main propulsion systems and components, e.g., rocket engines; and spacecraft auxilliary power sources.

For related information see also *07 Aircraft Propulsion and Power, 28 Propellants and Fuels, 44 Energy Production and Conversion,* and *15 Launch Vehicles and Space Vehicles.*

N92-12047# Interagency Nuclear Safety Review Panel.
SAFETY EVALUATION REPORT FOR ULYSSES, VOLUME 1
Sep. 1990 97 p Sponsored by DOE
(DE91-013473; INSRP-90-01-Vol-1) Avail: NTIS HC/MF A05

This Safety Evaluation Report comprises three volumes. The evaluation summary is provided in this document, Volume 1, along with the background information about the Ulysses Mission, the Space Shuttle, the launch environs, and accident scenarios. The Executive Summary also is provided. DOE

N92-12048# Johns Hopkins Univ., Columbia, MD. Chemical Propulsion Information Agency.
THE 27TH JANNAF COMBUSTION SUBCOMMITTEE MEETING, VOLUME 1
Mary T. Gannaway, ed. Nov. 1990 632 p Meeting held in Cheyenne, WY, 5-9 Nov. 1990
(Contract N00014-91-C-0001)
(CPIA-Publ-557-Vol-1) Avail: NTIS HC/MF A99

This volume, one of four, is a collection of 57 papers which were presented at the conference. Specific subjects discussed include advanced diagnostic techniques, VHBR propellants, electrothermal gun technology, gun propellant burn rate studies, combustion cartridge cases, and liquid propellant guns. For individual titles, see N92-12049 through N92-12051.

N92-12049*# National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.
CARS TEMPERATURE MEASUREMENTS IN A HYPERSONIC PROPULSION TEST FACILITY **c14**
Olin Jarrett, Jr., M. W. Smith, R. R. Antcliff, G. Burt Northam, A. D. Cutler, D. P. Capriotti, and D. J. Taylor (Los Alamos National Lab., NM.) *In* JHU, The 27th JANNAF Combustion Subcommittee Meeting, Volume 1 Nov. 1990 p 565-573 (For primary document see N92-12048 03-20)
Avail: NTIS HC/MF A99 CSCL 14B

Nonintrusive diagnostic measurements were performed in the supersonic reacting flow of the Hypersonic Propulsion Test Cell 2 at NASA-Langley. A Coherent Anti-stokes Raman Spectroscopy (CARS) system was assembled specifically for the test cell environment. System design considerations were: (1) test cell noise and vibration; (2) contamination from flow field or atmospheric borne dust; (3) unwanted laser or electrically induced combustion (inside or outside the duct); (4) efficient signal collection; (5) signal splitting to span the wide dynamic range present throughout the flow field; (6) movement of the sampling volume in the flow; and (7) modification of the scramjet model duct to permit optical access to the reacting flow with the CARS system. The flow in the duct was a nominal Mach 2 flow with static pressure near one atmosphere. A single perpendicular injector introduced hydrogen into the flow behind a rearward facing step. CARS data was obtained in three planes downstream of the injection region. At least 20 CARS data points were collected at each of the regularly spaced sampling locations in each data plane. Contour plots of scramjet combustor static temperature in a reacting flow region are presented. Author

N92-12050*# Pennsylvania State Univ., University Park. Propulsion Engineering Research Center.
A PLANAR-FLUORESCENCE IMAGING TECHNIQUE FOR STUDYING DROPLET-TURBULENCE INTERACTIONS IN VAPORIZING SPRAYS
Dom A. Santavicca and E. Coy *In* JHU, The 27th JANNAF Combustion Subcommittee Meeting, Volume 1 Nov. 1990 p 575-581 Previously announced in IAA as A91-33193 Sponsored by NASA. Marshall Space Flight Center (For primary document see N92-12048 03-20)
Avail: NTIS HC/MF A99 CSCL 14B

Droplet turbulence interactions directly affect the vaporization and dispersion of droplets in liquid sprays and therefore play a major role in fuel oxidizer mixing in liquid fueled combustion systems. Proper characterization of droplet turbulence interactions in vaporizing sprays require measurement of droplet size velocity and size temperature correlations. A planar, fluorescence imaging technique is described which is being developed for simultaneously measuring the size, velocity, and temperature of individual droplets in vaporizing sprays. Preliminary droplet size velocity correlation measurements made with this technique are presented. These measurements are also compared to and show very good agreement with measurements made in the same spray using a phase Doppler particle analyzer. Author

N92-12051# Pennsylvania State Univ., University Park. Propulsion Engineering and Research Center.
PLANAR LASER IMAGING OF SPRAYS FOR LIQUID ROCKET STUDIES **c35**
W. Lee, S. Pal, H. M. Ryan, P. A. Strakey, and Robert J. Santoro *In* JHU, The 27th JANNAF Combustion Subcommittee Meeting, Volume 1 Nov. 1990 p 611-621 Sponsored in part by DOE (For primary document see N92-12048 03-20)
Avail: NTIS HC/MF A99

A planar laser imaging technique which incorporates an optical polarization ratio technique for droplet size measurement was studied. A series of pressure atomized water sprays were studied with this technique and compared with measurements obtained using a Phase Doppler Particle Analyzer. In particular, the effects of assuming a logarithmic normal distribution function for the droplet size distribution within a spray was evaluated. Reasonable agreement between the instrument was obtained for the geometric mean diameter of the droplet distribution. However, comparisons based on the Sauter mean diameter show larger discrepancies, essentially because of uncertainties in the appropriate standard deviation to be applied for the polarization ratio technique. Comparisons were also made between single laser pulse (temporally resolved) measurements with multiple laser pulse visualizations of the spray. Author

N92-12052*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, AL.
AUTOMATING A SPACECRAFT ELECTRICAL POWER SYSTEM USING EXPERT SYSTEMS

L. F. Lollar Washington Oct. 1991 22 p
(NASA-TP-3161; M-670; NAS 1.60:3161) Avail: NTIS HC/MF A03 CSCL 10B

Since Skylab, Marshall Space Flight Center (MSFC) has recognized the need for large electrical power systems (EPS's) in upcoming Spacecraft. The operation of the spacecraft depends on the EPS. Therefore, it must be efficient, safe, and reliable. In 1978, as a consequence of having to supply a large number of EPS personnel to monitor and control Skylab, the Electrical power Branch of MSFC began the autonomously managed power system (AMPS) project. This project resulted in the assembly of a 25-kW high-voltage dc test facility and provided the means of getting man out of the loop as much as possible. AMPS includes several embedded controllers which allow a significant level of autonomous operation. More recently, the Electrical Division at MSFC has developed the space station module power management and distribution (SSM/PMAD) breadboard to investigate managing and distributing power in the Space Station Freedom habitation and laboratory modules. Again, the requirement for a high level of autonomy for the efficient operation over the lifetime of the station and for the benefits of enhanced safety has been demonstrated. This paper describes the two breadboards and the hierarchical approach to automation which was developed through these projects. Author

N92-12053# Oak Ridge National Lab., TN.
CHARACTERISTICS OF AN ELECTRON-BEAM ROCKET PELLET ACCELERATOR
C. C. Tsai, C. A. Foster, S. L. Milora, and D. E. Schechter 1991 6 p Presented at the 14th IEEE Symposium on Fusion Engineering, San Diego, CA, 30 Sep. - 3 Oct. 1991
(Contract DE-AC05-84OR-21400)
(DE92-000073; CONF-910968-2) Avail: NTIS HC/MF A02

A proof-of-principle (POP) electron-beam pellet accelerator has been developed and used for accelerating hydrogen and deuterium pellets. An intact hydrogen pellet was accelerated to a speed of 460 m/s by an electron beam of 13.5 keV. 0.3 A, and 2 ms. The maximum speed is limited by the acceleration path length (0.4 m) and pellet integrity. Experimental data have been collected for several hundred hydrogen pellets, which were accelerated by electron beams with parameters of voltage up to 16 kV, current up to 0.4 A, and pulse length up to 10 ms. Preliminary results reveal that the measured burn velocity increases roughly with the square of the beam voltage, as the theoretical model predicts. The final pellet velocity is proportional to the exhaust velocity, which increases with the beam power. To reach the high exhaust velocity needed for accelerating pellets to greater than 1000 m/s, a new electron gun, with its cathode indirectly heated by a graphite heater and an electron beam, is being developed to increase beam current and power. A rocket casing or shell around the pellet has been designed and developed to increase pellet strength and improve the electron-rocket coupling efficiency. We present the characteristics of this pellet accelerator, including new improvements. DOE

N92-12054# Pacific Northwest Lab., Richland, WA.
AN INTEGRATED ENERGY APPROACH TO PROVIDING POWER AND PROPULSION FOR THE SPACE EXPLORATION INITIATIVE
Edmund P. Coomes, Jeffrey E. Dagle, Judith A. Bamberger, and Kent E. Noffsinger Sep. 1991 9 p Presented at the AIAA/NASA/OAI Conference on Advanced SEI Technologies, Cleveland, OH, 4-6 Sep. 1991 Previously announced in IAA as A91-52414
(Contract DE-AC06-76RL-01830)
(DE92-000143; PNL-SA-19771; CONF-9109226-17) Avail: NTIS HC/MF A02

A fully integrated energy-based approach to mission planning is needed if the Space Exploration Initiative (SEI) is to succeed. Such an approach would reduce the number of new systems and technologies requiring development. The resultant horizontal commonality of systems and hardware would reduce the direct economic impact of SEI and provide an economic benefit by greatly enhancing our international technical competitiveness through technology spin-offs and through the resulting early return on investment. Integrated planning and close interagency cooperation must occur if the SEI is to achieve its goal of expanding the human presence into the solar system and be an affordable endeavor. An energy-based mission planning approach gives each mission planner the needed power, yet preserves the individuality of mission requirements and objectives while reducing the concessions mission planners must make. This approach may even expand the mission options available and enhance mission activities. This paper describes power beaming as an energy-based approach to meeting the requirements for space power, space propulsion, surface power, and surface transportation. It examines the development of systems to meet requirements of near-Earth operations and how these systems and technologies can be used to meet SEI mission requirements. DOE

N92-12523# Canadian Space Agency, Ottawa (Ontario). Computer and Intelligent Systems Group.
SPACECRAFT ELECTRICAL POWER SYSTEM FAULT DETECTION/DIAGNOSIS AND RESOURCE MANAGEMENT
Peter J. Adamovits and Eric Jackson (International Submarine Engineering Ltd., Port Coquitlam, British Columbia) *In* AGARD, Machine Intelligence for Aerospace Electronic Systems Sep. 1991 11 p (For primary document see N92-12517 03-63)
Copyright Avail: NTIS HC/MF A14; Non-NATO Nationals requests available only from AGARD/Scientific Publications Executive

23 CHEMISTRY AND MATERIALS (GENERAL)

No abstracts in this category.

24 COMPOSITE MATERIALS

Includes physical, chemical, and mechanical properties of laminates and other composite materials.
For ceramic materials see *27 Nonmetallic Materials.*

N92-12055# Oak Ridge National Lab., TN.
INTERFACE EFFECTS AND FRACTURE IN NICALON/SiC COMPOSITES
Richard A. Lowden 1990 18 p Presented at the 4th Conference on Fossil Energy Materials, Oak Ridge, TN, 15-17 May 1990
(Contract DE-AC05-84OR-21400)
(DE90-012925; CONF-900546-12) Avail: NTIS HC/MF A03

Thin coatings deposited on ceramic fibers prior to densification employing chemical vapor infiltration techniques have been used to limit fiber-matrix bonding. This has resulted in improvements in strength and toughness for Nicalon (trademark) fiber-reinforced/SiC matrix composites. The properties of the composites are influenced by the thickness of the graphite carbon interlayer. Matrix cracking, work of fracture, and ultimate strength are controlled by the nature of the interface. Interfacial forces were measured utilizing the indentation method in which a standard microhardness indentor is used to push on fibers embedded in the ceramic matrix. Correlations between interfacial phenomena and observed mechanical behavior have been made. DOE

N92-12056 Rutgers - The State Univ., New Brunswick, NJ.
THEORY OF INCLUSIONS IN THE ELASTIC AND ELASTIC-PLASTIC DEFORMATION OF COMPOSITE MATERIALS Ph.D. Thesis
Yanping Qiu 1991 222 p
Avail: Univ. Microfilms Order No. DA9125394

The overall elastic and elastoplastic behavior of two and

multiphase composites reinforced (or weakened) with aligned and randomly oriented spheroidal inclusions were studied. Emphasis was placed on the influence of inclusion shape and volume concentration with no restriction placed on the elastic moduli of inclusions which may be totally rigid or become voids. In the elastic case, the exact solutions and bounds of the elastic moduli for thickly coated particle and fiber reinforced composites was first derived. The theory was then extended to to a polycrystal with transversely isotropic grains, where the elastic constants with equiaxial grains and their grain shape, where the elastic constants with equiaxial grains and their grain shape dependence are established. The nonlinear elastoplastic behavior of a two phase composite was studied for a system where elastic, randomly oriented spheroidal inclusions were homogeneously embedded in the ductile matrix. It was found that more so than the elastic behavior, the overall elastoplastic response of a two phase composite was quite sensitive to the inclusion shape, with discs providing the most strengthening effect. Dissert. Abstr.

N92-12057# Naval Ship Research and Development Center, Annapolis, MD. Ship Materials Engineering Dept.
INFLUENCES OF EXPANDING MONOMER ON CARBON FIBER REINFORCED EPOXY COMPOSITES 2 Research and Development Report
Barbara Howell Jun. 1991 26 p
(AD-A240583; DTRC/SME-91/31) Avail: NTIS HC/MF A03
CSCL 11/4

Copolymerization of dinorbornene spiroorthocarbonate (DNSOC) with epoxy to eliminate sample shrinkage and produce sample expansion was investigated. To maximize control of shrinkage, it is important to bring epoxy to the gel stage before the DNSOC begins to copolymerize. Diglycidyl ether of bisphenol A (DGEBA) epoxy was cured with m-phenylenediamine (mPDA) and DNSOC-epoxy samples were cured with mPDA and BF3.diethylenetriamine (BF3 was used to catalyze polymerization of the DNSOC). As compared with carbon fiber reinforced epoxy, the sample with 5 percent DNSOC showed 33 percent reduction in interfacial shear stress as measured by the nanoindentation test, and reduction in residual stress perpendicular to the plies by interferometry. However, the significant differences in fiber volume fraction between the epoxy samples can account for some of this apparent reduction. The resin itself showed increases in both tensile strength and tensile modulus when 5 percent DNSOC was incorporated, and the sample showed no shrinkage. GRA

N92-12058# National Research Council of Canada, Ottawa (Ontario). Structures and Materials Lab.
A BRIEF REVIEW OF WROUGHT ALUMINUM ALLOY METAL MATRIX COMPOSITES REINFORCED BY SILICON CARBIDE WHISKERS
F. Chartrand, R. T. Holt (Ecole Polytechnique, Montreal, Quebec), G. LEsperance, and R. Allem 4 May 1990 39 p Sponsored by Dept. of National Defence and Defence Research Establishment Pacific
(NRC-LTR-ST-1765; CTN-91-60246) Copyright Avail: NTIS HC/MF A03

The various ways that have been used to produce wrought aluminum metal matrix composites reinforced with silicon carbide whiskers are briefly described. The most common techniques to date are blending of aluminum alloy powders with whiskers followed by consolidation and squeeze infiltration of whisker preforms by a liquid aluminum alloy. Mechanical properties of a number of metal matrix composites, primarily based on the alloys 2024, 6061 and 7075 are described. Where possible, comparisons are made between composites reinforced by silicon carbide whiskers and those reinforced by silicon carbide particulates. There is ample evidence that silicon carbide whisker reinforcement of aluminum alloys provides improved room temperature strength and stiffness and increased fatigue strength. Other properties of aluminum alloys which are enhanced by silicon carbide whisker reinforcement are high temperature strength, wear resistance and the linear coefficient of thermal expansion. These improvements are obviously of interest to aircraft manufactures but must be considered carefully in view of the decrease in ductility and lower levels of fracture toughness that are found. In addition, the electrical and thermal conductivities of alloys are both decreased by the addition of ceramic constituents. Author (CISTI)

N92-12059# National Research Council of Canada, Ottawa (Ontario). Structures and Materials Lab.
IMPROVED SPECIMEN SUPPORT JIG FOR HOT-WET COMPRESSION TESTING
P. C. Gaudert, R. F. Scott, and S. Lee Sep. 1990 30 p
(NRC-LTR-ST-1790; CTN-91-60247) Copyright Avail: NTIS HC/MF A03

A specimen support jig was developed for hot-wet compression testing of reinforced plastic composites. The jig was designed to overcome the specimen end-brooming and frictional uncertainties associated with a continuous rigid support jig such as described in the American Society for Testing and Materials (ASTM) Test Method D 695. The newly developed hardware procedures and modifications to the specimen design were applied in testing a representative carbon epoxy laminate made from Hercules AS4/3501-6 unidirectional prepreg with a lay-up configuration of (+45/-45/0/90/0/90/-45/+45)s. Dry samples were tested at room temperature while the wet conditioned specimens were tested at elevated temperature so as to demonstrate the reliable performance of the jig under two environmental test conditions. The testing showed a 38 percent strength reduction in the hot-wet condition and confirmed that end-brooming and failure in the clamped specimen sections within end tabs were prevented in the new jig. Author (CISTI)

N92-12060# Defence Research Establishment Pacific, Victoria (British Columbia). Research and Development Branch.
A DAMAGE TOLERANCE ASSESSMENT OF BONDED REPAIRS TO CF-18 COMPOSITE COMPONENTS. PART 1: ADHESIVE PROPERTIES
Alan J. Russell Dec. 1988 32 p
(DREP-TM-88-25-Pt-1; AD-A210523; CTN-91-60270) Avail: NTIS HC/MF A03

The damage tolerance properties of three epoxy adhesives used in the manufacture and repair of the composite structure on the CF-18 aircraft are assessed. The resistance to both static fracture and fatigue crack growth are evaluated. Experimental variables include the mode of fracture (tension and shear), the fatigue load ratio, the test temperature and the method of bonding. Both the static and fatigue tests were found to rank the adhesives in the same order, viz. FM-300K superior to FM-300 superior to EA-9321. The fatigue testing revealed a tendency for delamination failures to occur at low temperature, a situation likely to lead to non conservative joint designs. The fatigue crack growth rate data are explained in terms of the failure mechanisms observed. The implication of these findings to the selection of repair adhesives for composite aircraft structure is discussed. Author (CISTI)

N92-12061# National Research Council of Canada, Boucherville (Quebec). Industrial Materials Research Inst.
PHYSICOCHEMICAL CHARACTERIZATION OF HIGH-PERFORMANCE FIBRE-REINFORCED ORGANIC-MATRIX COMPOSITES. PART 6: METHODS FOR QUALITY CONTROL OF MATRIX CHEMISTRY
K. C. Cole and Denis Noel Feb. 1988 108 p
(NRC-28667-Pt-6; NRC-IGM88RT-101-686-G-Pt-6; CTN-91-60284)
Avail: NTIS HC/MF A06

This report is concerned with the application of physico chemical testing methods to high performance composite materials consisting of high strength reinforcing fibers embedded in an organic polymer matrix. The objective of the research project was to develop improved methods for the rapid and accurate characterization of the chemical composition of the organic matrix materials. In the first stage of the work, optimized methods were developed for a typical commercial carbon-epoxy system, Narmco Rigidite 5208/WC3000. The techniques employed are Fourier transform infrared spectroscopy, liquid chromatography, thermal analysis, and pyrolysis-gas chromatography. In Fourier transform

infrared spectroscopy (FT-IR), three different methods of obtaining the spectrum were evaluated: transmission of a thin film of resin, attenuated total reflected of prepreg, and diffuse reflection of prepreg or cured composite. The major advantage of the pyrolysis-gas chromatography technique is that it can be applied at all stages of cure. A major study was undertaken of the changes occurring in Narmco prepreg when it is exposed to ambient temperature and 50 percent relative humidity for periods of up to 60 days. It was shown that the system undergoes significant changes in chemistry and that these are easily and accurately detected using methods developed in this program. Some of the methods developed for Narmco were applied without modification to a number of commercial systems, generally with good results. CISTI

N92-12062# National Research Council of Canada, Boucherville (Quebec). Industrial Materials Research Inst.
TENSILE PROPERTIES OF INJECTION MOLDED LONG FIBER THERMOPLASTIC COMPOSITES
J. Denault, T. Vu-Khanh, and B. Foster 1988 39 p
(NRC-29456; NRC-IGM88AP-103-778-G; CTN-91-60309)
Copyright Avail: NTIS HC/MF A03

This paper deals with the mechanical performances of a new class of injection molded long fiber composites based on polypropylene (PP) and polybutylene terephthalate (PBT) matrices. Effects of material parameters such as fiber concentration, breakage, orientation and matrix composition are analyzed. The critical fiber length, l(c), of the PP long fiber composite, evaluated from the pull-out length of the tensile fracture surface was found to be much higher than those which are previously reported. Tensile strength calculated from the measured l(c) and fiber length distribution in the molded samples was found in agreement with the measured values. From this work it is concluded that higher mechanical performances of the long fiber reinforced thermoplastics will be attained by the injection molding process to further reduce fiber breakage. Author (CISTI)

N92-12063*# Purdue Univ., West Lafayette, IN. School of Aeronautics and Astronautics.
DYNAMIC DELAMINATION CRACK PROPAGATION IN A GRAPHITE/EPOXY LAMINATE Final Report
J. E. Grady and C. T. Sun Oct. 1991 161 p
(Grant NAG3-211)
(NASA-CR-187226; NAS 1.26:187226) Avail: NTIS HC/MF A08
CSCL 11D

Dynamic delamination crack propagation in a (90/0) 5s Graphite/Epoxy laminate with an embedded interfacial crack was investigated experimentally using high speed photography. The dynamic motion was produced by impacting the beamlike laminate specimen with a silicon rubber ball. The threshold impact velocities required to initiate dynamic crack propagation in laminates with varying initial crack positions were determined. The crack propagation speeds were estimated from the photographs. Results show that the through the thickness position of the embedded crack can significantly affect the dominant mechanism and the threshold impact velocity for the onset of crack movement. If the initial delamination is placed near the top of bottom surface of the laminate, local buckling of the delaminated plies may cause instability of the crack. If the initial delamination lies on the midplane, local buckling does not occur and the initiation of crack propagation appears to be dominated by Mode II fracture. The crack propagation and arrest observed was seen to be affected by wave motion within the delamination region. Author

N92-12064# Aerospatiale, Paris (France). Space and Strategic Systems Div.
STRUCTURES AND FRACTURE MECHANIC OF BRITTLE MATRIX COMPOSITES
J. F. Jamet and P. Peres 1991 104 p Presented at the Comet Courses, Paris, France, 24-26 Jun. 1991
(Rept-911-430-131; ETN-91-90262) Avail: NTIS HC/MF A06

Although ceramic and carbon/carbon composites with protective coatings ally toughness, refractoriness and resistance to oxidation progress is under way to meet new demands for toughness at high temperature in special environments and to develop the industrial technology for manufacturing parts, in accordance with traditional quality methods. A course which is founded on the research and development experience of space materials and structures laboratory charged with the following is described: developing industrial manufacturing processes (prototypes); characterizing materials and predicting their behavior; elaborating nondestructive testing technology; the corresponding appraisals. The aim of this course is to show how the mechanical and thermomechanical aspects of this new type of material are closely linked to the constantly advancing process. ESA

N92-12065# Aerospatiale, Paris (France).
NONDESTRUCTIVE TESTING OF OXIDATION PROTECTED CARBON/CARBON MATERIALS [LE CONTROLE NON DESTRUCTIF DES CARBONE/CARBONE PROTEGES CONTRE L'OXYDATION]
Patrice Plotard 1991 12 p In FRENCH
(Rept-911-430-136; ETN-91-90267) Avail: NTIS HC/MF A03

The nose cone and attack edges of Hermes are submitted to temperatures up to 1800C during atmospheric reentry. Only oxidation protected carbon/carbon materials can resist such temperatures. The nondestructive tests described are intended to guarantee the structural strength of components and the resistance of the oxidation protection layer. The testing methods used are US, simulated IR thermography, Compton retrodiffusion and Foucault currents. A brief description of these test methods is presented. ESA

N92-12066# Aerospatiale, Paris (France).
NONDESTRUCTIVE TESTING OF SANDWICH STRUCTURES [LE CONTROLE NON DESTRUCTIF DES STRUCTURES SANDWICHS]
Pierre Barbier 1991 8 p In FRENCH
(Rept-911-430-137; ETN-91-90268) Avail: NTIS HC/MF A02

Techniques used in nondestructive testing of honeycomb sandwich structures are described. Infrared thermography techniques used in such testing and ultrasonic methods using water jets, are given special attention. The nondestructive techniques described are suitable for testing during construction or maintenance of aerospace structures. They are particularly useful in testing large light structures such as the SYLDA (French acronym for Ariane double launching system). ESA

N92-12067# Aerospatiale, Paris (France).
ACOUSTIC EMISSION APPLIED TO COMPOSITE MATERIAL STRUCTURES [L'EMISSION ACOUSTIQUE APPLIQUEE AUX STRUCTURES EN MATERIAU COMPOSITE]
Christian LeFloch 1991 9 p In FRENCH
(Rept-911-430-138; ETN-91-90269) Avail: NTIS HC/MF A02

The potential of acoustic emission techniques in nondestructive testing is discussed. The technique involves recording the acoustic waves emanating from sites where there has been damage. Acoustic emission is sensitive to evolving failure only. This is an important characteristic that distinguishes it from classic nondestructive testing techniques. It allows for real time localization of faults or damage in a structure. It can also pinpoint a change of phase in the material resulting in a release of energy, as is the case in a change from an elastic to a plastic phase. The use of the technique in early failure warning is discussed. ESA

N92-12068# Ecole Nationale Superieure de Techniques Avancees, Paris (France). Groupe Composites et Collage.
THEORETICAL AND EXPERIMENTAL ANALYSIS OF THE FINE MECHANICAL BEHAVIOR OF A GLUED ASSEMBLY WITH DOUBLE SLANTING LAYERS Final Report [ANALYSE EXPERIMENTALE ET THEORIQUE DU COMPORTEMENT MECANIQUE FIN D'UN ASSEMBLAGE COLLE A DOUBLE RECOUVREMENT BISEAUTE]
Yvon Gilibert (Reims Univ., France) and Michel L. L. Klein 1991 79 p In FRENCH

(Contract ARMINES/DRET-87-236)
(ETN-91-90277) Avail: NTIS HC/MF A05

The fine mechanical behavior of two glued assemblies both with double layers is compared. One of the assemblies has it's joint covers sheared smooth. The active surfaces are submitted to a sulfochromic treatment applied directly to the aluminum alloy surface 2024 PLA5 T3. The geometry and surface rugosity of the active surfaces are defined using the Abbot curve. Traction experiments are used to test the mechanical behavior of the structures. Deformation and extension is measured using electric gauges and simultaneous acoustic emission. The results of these tests carried out at room temperature, are presented. For individual titles, see N92-12069 through N92-12069.

N92-12069# Ecole Nationale Superieure de Techniques Avancees, Paris (France). Groupe Composites et Collage.
DETAILED BEHAVIOR OF A GLUED DOUBLE LAYER ASSEMBLY IN TERMS OF THE SHEARING-OFF OF JOINT COVERS [LE COMPORTEMENT DETAILLE DE L'ASSEMBLAGE COLLE, A DOUBLE RECOUVREMENT EN FONCTION DU BISEAUTAGE DES COUVRE JOINTS]
Yvon Gilibert (Reims Univ., France) and Michel L. L. Klein *In its* Theoretical and Experimental Analysis of the Fine Mechanical Behavior of a Glued Assembly with Double Slanting Layers 1991 p 54-64 In FRENCH Presented at 10th Congres International de Rheologie, Sydney, Australia, 1988 Sponsored by Ministere de la Defense, ARMINES, and Ministere de la Recherhce et de l'Industrie (For primary document see N92-12068 03-24)
Avail: NTIS HC/MF A05

The formation of small cracks well before total cracking appears in joint covers is studied. This cracking is analogous to edge effects which appear in composite and stratified materials. It is studied by means of extensometers placed at the exterior surface of metal panels. The dimensions and mechanical properties of the joint are optimized in order to extend the cracking limit. The metal panels studied are of steel with 0.18 carbon content. Their longitudinal elasticity is 207,700 MPa and their Poisson coefficient is 0.288. The adhesive is a structural glue EPONAL 317 polymerized at room temperature. Its Young module is 5800 MPa and its Poisson coefficient is 0.327. ESA

N92-12070# Oak Ridge National Lab., TN.
SPATIAL VARIABILITY IN THE TENSILE STRENGTH OF AN EXTRUDED NUCLEAR-GRADE GRAPHITE
J. P. Strizak 1991 12 p Presented at the International Atomic Energy Agency (IAEA) Specialists Meeting on Status of Graphite Development for Gas-cooled Reactors, Tokai, Japan, 9-12 Sep. 1991
(Contract DE-AC05-84OR-21400)
(DE91-018868; CONF-9109266-2) Avail: NTIS HC/MF A03

This report will present the results of a study on spatial variations in the strength of nuclear-grade H-451 graphite. The tensile properties of H-451 were examined extensively in the past in order to characterize the variability of strength within billets, between billets, and between lots. But the variability within a billet was, for the most part, studied only casually. The problem appeared to be strong influence of a limited sampling plan in describing the mean strength and the viability. Therefore, an extensive, statistically sound sampling plan has been devised to fully characterize the spatial variability within a single billet. A new fracture model developed by Burchell was applied to the data with encouraging results. This probabilistic failure criteria combines a microstructural basis with a fracture-mechanics approach to failure. DOE

N92-12071# Oak Ridge National Lab., TN.
HIGH-TEMPERATURE CORROSION OF NICALON(TM)/SiC COMPOSITES
R. A. Lowden and R. D. James Aug. 1991 29 p
(Contract DE-AC05-84OR-21400)
(DE92-000281; ORNL/TM-11893) Avail: NTIS HC/MF A03

The elevated-temperature stability of Nicalon (Nippon Carbon Company, Tokyo, Japan)/SiC composites with a graphitic carbon interface layer in oxidizing and simulated fossil fuel environments was investigated. Composite specimens with and without an external SiC surface coating were oxidizing in air and exposed to a variety of combustion environments at a temperature of 1273 K. A burner rig furnace was constructed for simulating corrosive fossil fuel environments containing water vapor, sulfur, and sodium. The mechanical properties of unprotected Nicalon/SiC specimens were degraded after short periods of exposure, due to the oxidation of the carbon interface coating. Longer exposures resulted in the oxidation of the fibers and matrix to form silica, which with time bonded the components together and produced brittle behavior. Combustion environments hastened the embrittlement of composites without an external SiC coating. Conversely, the specimens protected by a chemical vapor deposition (CVD) SiC surface coating exhibited only small decreases in strength after oxidation or corrosion in combustion environments. The SiC layer sealed off the surface of the composites, protecting the exposed fibers' ends, and thus prevented oxidation at the fiber-matrix interface. DOE

25 INORGANIC AND PHYSICAL CHEMISTRY

Includes chemical analysis, e.g., chromatography; combustion theory; electrochemistry; and photochemistry.

For related information see also *77 Thermodynamics and Statistical Physics.*.

N92-12072# Sandia National Labs., Albuquerque, NM.
APPLICATION OF PARALLEL COMPUTING TO THE MONTE CARLO SIMULATION OF ELECTRON SCATTERING IN SOLIDS: A RAPID METHOD FOR PROFILE DECONVOLUTION
A. D. Romig, Jr., S. J. Plimpton, R. L. Myklebust, and D. E. Newbury 1990 3 p Presented at the 12th International Congress for Electron Microscopy, Seattle, WA, 12-18 Aug. 1990
(Contract DE-AC04-76DP-00789)
(DE90-009322; SAND-90-0632C; CONF-900877-2) Avail: NTIS HC/MF A01

X-ray microanalysis by analytical electron microscopy (AEM) has proven to be a powerful tool for characterizing the spatial distribution of solute elements in materials. True compositional variations over spatial scales smaller than the actual resolution for microanalysis can be determined if the measured composition profile is deconvoluted. Explicit deconvolutions of such data, via conventional techniques such as Fourier transforms, are not possible due to statistical noise in AEM microanalytical data. Hence, the method of choice is to accomplish the deconvolution via iterative convolutions. In this method, a function describing the assumed true composition profile, calculated by physically permissible thermodynamic and kinetic modeling is convoluted with the x-ray generation function and the result compared to the measured composition profile. If the measured and calculated profiles agree within experimental error, it is assumed that the true compositional profile has been determined. If the measured and calculated composition profiles are in disagreement, the assumptions in the physical model are adjusted and the convolution process repeated. To employ this procedure it is necessary to calculate the x-ray generation function explicitly. While a variety of procedures are available for calculating this function, the most accurate procedure is to use Monte Carlo modeling of electron scattering. DOE

N92-12073# Kentucky Univ., Lexington. Research Foundation.
METALLACUMULENES AND CARBIDE COMPLEXES
J. P. Selegue 25 Jan. 1990 8 p
(Contract DE-FG05-85ER-13432)
(DE90-011324; DOE/ER-13432/6) Avail: NTIS HC/MF A02

During this year, we worked on several aspects of metallacumulene chemistry. Our long term goal is to obtain a better understanding of the behavior of carbides of other carbon rich fragments which result from transformations of carbon monoxide and acetylene on heterogeneous catalysts. A practical

goal of this year's work was to get several unfinished projects into publishable form. Research areas are summarized in this report according to the graduate student of postdoctoral associate carrying out the work. DOE

N92-12074# Sandia National Labs., Albuquerque, NM.
CURRENT ISSUES IN SOL-GEL REACTION KINETICS
R. A. Assink and B. D. Kay 1990 13 p Presented at the Spring Meeting of the Materials Research Society, San Francisco, CA, 16-21 Apr. 1990
(Contract DE-AC04-76DP-00789)
(DE90-012226; SAND-90-1049C; CONF-900466-55) Avail: NTIS HC/MF A03

This paper surveys a few of the current issues in sol-gel reaction kinetics. Many times seemingly modest changes in reactants or reaction conditions can lead to substantial differences in the overall reaction rates and pathways. For example, qualitative features of the reaction kinetics can depend on catalyst concentration. At very high acid-catalyst concentrations, reverse are significant for TMOS sol-gels, while for moderate acid-catalyst concentrations, reverse reactions are substantially reduced. The reaction kinetics are substantially reduced. The reaction kinetics of two similar tetraalkoxysilanes: tetramethoxysilane (TMOS) and tetraethoxysilane (TEOS), can be markedly different under identical reaction conditions. Under acid-catalyzed reaction conditions, a TMOS sol-gel undergoes both water- and alcohol-producing condensation reactions while a TEOS sol-gel undergoes only water-producing condensation. The early time hydrolysis and condensation reactions of a TMOS sol-gel are statistical in nature and can be quantitatively described by a few simple reaction rate constants while the reaction behavior of a TEOS sol-gel is markedly nonstatistical. A comprehensive theory of sol-gel kinetics must address diverse experimental findings. DOE

N92-12075# Oak Ridge National Lab., TN.
CHEMICAL POTENTIAL FROM INTEGRAL EQUATIONS USING SCALED PARTICLE THEORY
D. M. Pfund (Oklahoma Univ., Norman.) and H. D. Cochran Apr. 1990 259 p
(Contract DE-AC05-84OR-21400)
(DE90-011277; ORNL/TM-11501) Avail: NTIS HC/MF A12

A new method is presented for calculating chemical potentials using integral equation theories. The method uses a multi-step charging process which allows attractive and repulsive contributions to the chemical potential to be determined separately. Integral equation theories are used to provide needed correlation functions about the test particle. A novel application of particle scaling is used to determine the repulsive contribution to the chemical potential. A formal definition is given for the effective hard core diameter of a softly repulsive solute. A simple Kirkwood charging process is used to determine the attractive contribution. The method provides accurate chemical potentials in mixtures of softly repulsive WCA particles when used with the HMSA/Rogers-Young integral equation. Calculated excess Gibbs energies agreed with WCA repulsive simulations to an average of -0.67 percent for 2:1 diameter ratio mixtures. The method provides approximate results in Lennard-Jones mixtures when used with the HMSA integral equation. Results for supercritical isotherms reproduce simulation data to an average of -3.0 percent. For subcritical isotherms, vapor results are exact while liquid results are qualitatively correct. The method used with the HMSA theory correctly predicts the effect of energy ratio on the Henry's Law constant. The predicted effect of size ratio on the constant has an incorrect slope at subcritical temperatures when the solvent density is near the value for a saturated liquid. The incorrect slope reflects an inconsistency in the HMSA theory. DOE

N92-12076# Los Alamos National Lab., NM.
HYDROGEN ISOTOPIC EXCHANGE OVER PALLADIUM METAL
D. H. W. Carstens and P. D. Encinias 1990 12 p Presented at the International Symposium on Metal-Hydrogen Systems, Banff (Canada), 2-7 Sep. 1990
(Contract W-7405-eng-36)
(DE90-012063; LA-UR-90-1762; CONF-9009141-1) Avail: NTIS HC/MF A03

We have recently developed the laser-Raman technique as a means of unambiguously measuring the partial pressures of all possible hydrogen isotopes in the gas phase. Using this technique we have investigated the hydrogen-deuterium exchange in a number of metals. This report presents detailed data for isotopic exchange in the palladium hydride system over the temperature range 26 to -100 C at a pressure of 7 atm. First order kinetic rate constants and activation energies are summarized for the forward (hydride to deuteride) and reverse (deuteride to hydride) exchange processes. In addition, we have found that small amounts (100 ppm) of impurities in the exchange gases considerably slow the exchange kinetics with the effect increasing down the series CH4, CO2, H2O, and CO. DOE

N92-12077# Los Alamos National Lab., NM.
RESONANCE IONIZATION MASS SPECTROMETRY FOR MATERIALS ANALYSIS AND CHARACTERIZATION
N. S. Nogar and R. C. Estler 1990 10 p Presented at the Meeting on Optical Spectroscopic Instrumentation and Techniques for the 1990s: Applications in Astronomy, Chemistry and Physics, Las Cruces, NM, 4-6 Jun. 1990
(Contract W-7405-eng-36)
(DE90-013187; LA-UR-90-1945; CONF-900656-3) Avail: NTIS HC/MF A02

Resonance ionization mass spectroscopy (RIMS) is an analytical tool discovered in the 1970's, developed primarily in the 1980's, and one which will undoubtedly see continued and expanding use through the 1990's. This technique combines laser ionization with mass spectrometric sorting and detection to yield results of unparalleled sensitivity and selectivity. We discuss the application of RIMS to the analysis of conventional analytical samples, as well as the combinations of RIMS with laser or particle beam sputtering for the analysis of solids and surfaces with minimal sample preparation. DOE

N92-12078# California Univ., Berkeley. Lawrence Berkeley Lab.
NITROGEN DIOXIDE FLUORESCENCE FOLLOWING PHOTOLYSIS IN A SUPERSONIC JET Ph.D. Thesis
W. N. Sisk May 1990 261 p
(Contract DE-AC03-76SF-00098)
(DE90-014164; LBL-29112) Avail: NTIS HC/MF A12

A supersonic jet of N2O4 has been photolyzed at three wavelengths: 193, 248 and 351 nm. The resultant fluorescence of NO2 was dispersed, and from this the energy distribution of fluorescent NO2 has been determined by the Photolysis Induced Fluorescence (PIF) scheme. The spread of the energy distribution increased with decreasing photolysis wavelength. The photolysis of NO2Cl at 248 nm resulting in NO2 fluorescence was analyzed by the PIF (Photolysis Induced Fluorescence) deconvolution scheme and these results were compared to and Time-of-Flight/Mass Spectrometry (TOF/MS) performed previously in Y.T. Lee's lab by Oh and Coworkers. The results from the pulsed beam PIF agreed with the TOF/MS results leading to 5 product channels in NO2Cl photolysis. The undispersed fluorescence of NO2 is observed following the excitation of NO2Cl, N2O4, and NO2. The Photolysis Induced Fluorescence Excitation (PIFEX) spectrum of NO2Cl shows a decrease in the fluorescence quantum yield, (phi sub f), when scanning to shorter wavelength. This decrease in phi sub f is attributed to the onset of the NO + O + Cl channel. The NO2 LIF spectra yield information on 3 parallel bands observed near 400 nm as well as a confirmation on D(sub 0), which is found here to be 3978.3 (+ or -) 0.03A (air-calibrated). DOE

N92-12079*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.
METHOD FOR PRODUCING OXYGEN FROM LUNAR MATERIALS Patent Application
Thomas A. Sullivan, inventor (to NASA) 24 Sep. 1991 29 p

(NASA-Case-MSC-21759-1; NAS 1.71:MSC-21759-1; US-Patent-Appl-SN-746581) Avail: NTIS HC/MF A03 CSCL 07D

This invention is related to producing oxygen from lunar or Martian materials, particularly from lunar ilmenite in situ. The process includes producing a slurry of the minerals and hot sulfuric acid, the acid and minerals reacting to form sulfates of the metal. Water is added to the slurry to dissolve the minerals into an aqueous solution, the first aqueous solution is separated from unreacted minerals from the slurry, and the aqueous solution is electrolyzed to produce the metal and oxygen. NASA

N92-12080 ESDU International Ltd., London (England).
THERMAL CONDUCTIVITY OF GASEOUS HALOGENATED HYDROCARBONS
May 1991 92 p
(ESDU-91005; ISBN-0-85679-767-7; ISSN-0141-4062) Avail: ESDU

ESDU 91005 presents the results of correlating experimental data extracted from the literature using a procedure that makes use of the critical temperature and pressure (taken from ESDU 87028) and the specific heat capacity at constant pressure of the ideal gas (taken from values published by Texas A & M University). The theoretical predictions of Svehla assisted in the case of nonpolar compounds but for polar compounds a study of the Eucken factor was also required to correlate the data from a wide range of sources and extend them to cover the range from the boiling point to at least 1.1 times the critical temperature (all at atmospheric pressures). For the 40 compounds considered (all the refrigerants currently used in industry), the range was equivalent to a temperature range of 200 K to 650 K. The correlated data were fitted by a third order polynomial in temperature, the coefficients of which are tabulated. The equations are used to compute two tables of thermal conductivity in SI units for each compound at intervals of either 20 K ar 20 C. The sources of the data for each compound are listed. The effect of pressure is discussed in general terms. ESDU

N92-12081 ESDU International Ltd., London (England).
VAPOUR PRESSURES AND CRITICAL POINTS OF LIQUIDS. HALOGENATED ETHYLENES
Apr. 1991 40 p Supersedes ESDU-76004 and ESDU-76006
(ESDU-91006; ESDU-76004; ESDU-76006; ISBN-0-85679-768-5; ISSN-0141-4062) Avail: ESDU

ESDU 91006 gives vapor pressure for 17 monhalo-, dihalo-, trihalo-, and tetrahaloehtylenes. The data were obtained by a critical evaluation of experimental results in the literature and fitted by a recently developed correlation method that allows the extrapolation of results in the higher pressure ranges into the low pressure region. The method also enabled correlations to be developed for compounds for which only restricted results were available using correlations for compounds for which a wide range of data existed. The Wagner equation was used over the full liquid range from the melting point to the critical point. The coefficients of the equation are given for each compound and three tables of vapor pressure values calculated using them are included: in SI units at 5 and 10 K intervals, in atmospheres at 5 and 10 C intervals, in lbf./sq. in. at 10 and 20 F intervals. A table also gives the saturation temperature at various specified pressures, and indicates the possible uncertainty in the calculated values. The sources of the data for each compound are included. ESDU

N92-12082 ESDU International Ltd., London (England).
THERMOPHYSICAL PROPERTIES OF NITROUS OXIDE
Sep. 1991 17 p
(ESDU-91022; ISBN-0-85679-784-7; ISSN-0141-4062; ISSN-0141-4070) Avail: ESDU

ESDU 91022 gives equations obtained from a critical evaluation of experimental data in the literature for the variation along the saturation line with temperature, for both the liquid and the vapor of: density, enthalpy, heat capacity at constant pressure, dynamic viscosity, and thermal conductivity. Also, equations for the variation with temperature along the saturation line of the vapor pressure, latent heat of vaporization, and surface tension are given together with equations for the variation with temperature for the ideal gas of specific heat capacity at constant pressure, enthalpy, dynamic viscosity, and thermal conductivity. Results on the saturation line evaluated in SI units using the equations are tabulated at 5 K intervals and at 5 C intervals from the normal melting point to the critical point, or as close to it as possible for some properties. Results for the ideal gas evaluated also in SI units using the equations are tabulated at 20 K intervals from the melting point to 1000 K. In the absence of experimental values, some of these results involve extrapolation and they are indicated in the tables. Conversion factors to facilitate use of the data in British units are included. ESDU

N92-12083*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, CA.
ANALYSIS OF MINERALS CONTAINING DISSOLVED TRACES OF THE FLUID PHASE COMPONENTS WATER AND CARBON DIOXIDE Final Report
Friedemann Freund Sep. 1991 125 p Sponsored in part by NATO and European Economic Communities
(Contract NCC2-446)
(NASA-CR-188993; NAS 1.26:188993) Avail: NTIS HC/MF A06 CSCL 07D

Substantial progress has been made towards a better understanding of the dissolution of common gas/fluid phase components, notably H2O and CO2, in minerals. It has been shown that the dissolution mechanisms are significantly more complex than currently believed. By judiciously combining various solid state analytical techniques, convincing evidence was obtained that traces of dissolved gas/fluid phase components undergo, at least in part, a redox conversion by which they split into reduced H2 and and reduced C on one hand and oxidized oxygen, O(-), on the other. Analysis for 2 and C as well as for any organic molecules which may form during the process of co-segregation are still impeded by the omnipresent danger of extraneous contamination. However, the presence of O(-), an unusual oxidized form of oxygen, has been proven beyond a reasonable doubt. The presence of O(-) testifies to the fact that a redox reaction must have taken place in the solid state involving the dissolved traces of gas/fluid phase components. Detailed information on the techniques used and the results obtained are given. Author

N92-12084# Sandia National Labs., Albuquerque, NM.
CHEMICAL ANALYSIS OF TRACE SUBSTANCES FROM EXPLOSIVES
H. A. Lakso (Swedish Defence Research Establishment, Umea.) Apr. 1991 26 p Transl. into ENGLISH from unidentified Swedish language article, May 1990
(Contract DE-AC04-76DP-00789)
(DE91-017833; ALS/TR-91-006) Avail: NTIS HC/MF A03

This report describes the work on mine detection through air analysis carried out during 1988-89. The objective of this work was to determine whether explosives contained in mines release such amounts of gaseous organic substances that they can be detected with the available technology (gas chromatography with selective detectors). In the first place we wished to investigate surface mines, with below-ground mines to be investigated at a later stage. Since explosives contained in mines release small amount of gas, which continuously expand in the surrounding atmosphere, an extremely sensitive measurement method was needed. The method selected consisted of a sampling part and an analysis part. Sampling was performed with the help of adsorbent tubes, i.e., glass tubes filled with a porous polymer, on the surface of which the gas would concentrate when air was passed through the tube. After sampling, the substances concentrated on the adsorbent were determined via so-called thermal desorption and gas chromatographic analysis. A number of laboratory tests were performed, in which the amount of explosive-related gas was determined for a few explosives and the impurities they contain. During the spring of 1989, field testing was also carried out, in which live mines were put in place and the air surrounding the mine field was sampled. DOE

N92-12085# National Research Council of Canada, Ottawa (Ontario). Gas Dynamics Lab.
THE CALCULATION OF THEORETICAL COHERENT ANTI-STOKES RAMAN SPECTRA
Thangam Parameswaran and D. R. Snelling Oct. 1988 123 p (NRC-29810; NRC-TR-GD-013; CTN-91-60286) Avail: NTIS HC/MF A06

Coherent anti-Stokes Raman spectroscopy (CARS) has received much attention in recent years because of its capability for providing remote, in situ measurements of major species concentration and temperature with good spatial and temporal resolution in practical combustion environments. This report briefly summarizes the theoretical principles underlying CARS. The role of collisional narrowing due to overlap of Raman lines, and appropriate convolution with the pump laser profile are discussed in some detail. The implementation of a computer code to calculate broadband nitrogen CARS spectra is described and the effect of the various assumptions and models on the resultant CARS spectrum is examined. The theoretical CARS spectra are compared with those calculated from a code developed at the Sandia National Laboratories, Livermore, California. Computer programs to fit experimental CARS spectra using a precalculated library of theoretical CARS spectra are described and examples are presented. Author (CISTI)

N92-12086# Paris-Sud Univ., Orsay (France). Lab. de Physique des Gaz et des Plasmas.
SPECTROSCOPIC ANALYSIS OF A DISCHARGE AND A POST DISCHARGE WITHIN A LOW PRESSURE AIR STREAM [ANALYSE SPECTROSCOPIQUE D'UNE DECHARGE ET D'UNE POST-DECHARGE EN ECOULEMENT D'AIR A BASSE PRESSION]
A. Ricard, P. Leprince, L. Hochard, A. Granier, and D. Chereau Oct. 1990 12 p In FRENCH
(Contract DRET-89-34-080-00-470-75-01)
(ETN-91-90098) Avail: NTIS HC/MF A03

The optical emission of excited compounds in O2/N2 gas mixtures are measured using spectroscopy. The O2/N2 gas mixtures found in air are given particular attention. The main compounds found in these discharges are neutral or charged forms in N2, O2, N, or NO. The distribution of electrons is found to be generally in agreement with Maxwell depending on the type of discharge studied. One can in a general sense define an average electron energy. Calculations of synthetic spectra for different states of N2, N2(+), and NO which allow for a diagnosis of rotational and vibrational temperatures are presented. ESA

N92-12087 National Physical Lab., Teddington (England). Div. of Materials Metrology.
RANDOM UNCERTAINTIES IN THE SURFACE SPECTROSCOPIES
P. J. Cumpson and M. P. Seah May 1991 58 p
(NPL-DMM(A)-26; ISSN-0959-2423; ETN-91-90298) Copyright Avail: National Physical Lab., Teddington, TW11 0LW, England

The problem of numerically evaluating random errors in the Auger and X-ray photoelectron spectroscopies is examined. A framework for extracting the one standard deviation uncertainties in the peak fitting of data for peak intensities, peak positions, peak widths, and Gaussian/Lorentzian ratios is considered. How the uncertainty in intensity propagates through to an uncertainty in the final quantified result is also considered. ESA

N92-12088# Oak Ridge National Lab., TN. Energy Div.
MEASUREMENTS OF HEAT AND MASS TRANSFER COEFFICIENTS DURING ABSORPTION OF WATER VAPOR BY LITHIUM BROMIDE AND (Li,K,Na)NO3 MIXTURES
A. Zaltash, M. R. Ally, R. L. Linkous, and L. N. Klatt 1991 26 p Presented at the American Society of Mechanical Engineers Annual Winter Meeting, Atlanta, GA, 1-6 Dec. 1991
(Contract DE-AC05-84OR-21400)
(DE91-014212; CONF-911213-3) Avail: NTIS HC/MF A03

A knowledge of heat and mass transfer coefficients in heat pump fluids, plays an important role in the design of absorption machines. Heat and mass transfer coefficients as well as subcooling are measured for absorption of water vapor in (Li, K, Na)NO3 and Lithium Bromide (LiBr) mixtures. The rate of absorption of water vapor is obtained from the difference in concentration of mixtures between inlet and outlet streams across the absorber. In situ concentrations of aqueous salt mixtures over temperature ranges between 80 to 135 C were calculated from density measurements. This technique of measurement is a reliable and convenient but not a very accurate (+/- 0.8 wt percent salt) method of measuring the in situ salt concentration. Results show that the subcooling at the absorber exit is not only a property of the fluid, but depends strongly on the process conditions. The subcooling in LiBr mixtures without additive is shown to vary between 2.2 and 24.3 C and the film heat transfer coefficient between 1365.2 and 801.1 W/sq m K respectively, depending upon process conditions. These empirical results will prove to be of value to heat pump manufacturers because they have a strong bearing on costs and performance. Heat and mass transfer coefficients in aqueous salt solutions are presented as a function of dimensionless numbers. DOE

N92-12089# Oak Ridge National Lab., TN.
DIFFRACTION BY MACROMOLECULAR FLUIDS
A. H. Narten, A. Habenschuss, K. G. Honnell, J. D. McCoy, J. G. Curro, and K. S. Schweizer (Illinois Univ., Urbana.) 1991 18 p Presented at the Faraday Symposium No. 27: The Conformations of Flexible Molecules in Fluid Phases, Southampton, England, 16-18 Dec. 1991
(Contracts DE-AC05-84OR-21400; DE-AC04-76DP-00789)
(DE91-016219; SAND-91-1847C; CONF-911209-1) Avail: NTIS HC/MF A03

X-ray diffraction data on n-alkane fluids ranging from n-butane to polyethylene are analyzed to yield the relative contributions from intra- and intermolecular scattering. The intramolecular contributions are calculated from an exact rotational-isomeric-state model at short length scales, and approximately by a self-consistent semiflexible chain model at global scales. With increasing chain length, the intermolecular pair distribution functions show the predicted self-screening, or de Gennes correlation hole, whereby sites on different chains are partially excluded from close approach to sites on a given chain. DOE

N92-12090# Oak Ridge National Lab., TN.
AN EXPERIMENTAL STUDY OF THE VOLATILITY OF AMMONIUM CHLORIDE FROM AQUEOUS SOLUTIONS TO HIGH TEMPERATURES
J. M. Simonson and D. A. Palmer 1991 12 p Presented at the 52nd International Water Conference, Pittsburgh, PA, 21-23 Oct. 1991
(Contract DE-AC05-84OR-21400)
(DE91-017875; CONF-911088-1) Avail: NTIS HC/MF A03

The EPRI fossil plant cycle chemistry monitoring project has provided detailed chemical analytical results for the water and steam cycles of four U.S. power plants. The results for the calculated chemical carryover of chloride were correlated with the expected ammonium chloride volatility in those plants using all-volatile treatment (AVT). It was found that chloride levels observed in the high-temperature steam are significantly higher than predicted on the basis of the commonly-used plots of solute volatility ratios, expressed as log (ppm in vapor)/(ppm in liquid) plotted against the logarithm of the density ratio of steam to liquid. The goal of the present project, undertaken at the request of EPRI, is to determine quantitatively the partitioning of chloride over aqueous solutions under conditions similar to those of AVT steam generators. A further goal is the determination of liquid-vapor partitioning ratios at lower temperatures, appropriate to the conditions found in steam turbines, and particularly those temperature and pressure conditions near the Wilson line. DOE

N92-12091# Massachusetts Inst. of Tech., Cambridge.
CONTROL OF CATALYTIC HYDROTREATING SELECTIVITY WITH AMMONIA

C. N. Satterfield and Chung M. Lee 1991 18 p
(Contract DE-FG22-89PC-89775)
(DE91-018084; DOE/PC-89775/5) Avail: NTIS HC/MF A03

Research continued on the control of catalytic hydrotreating selectivity with ammonia. Progress is discussed on the effect of ammonia on the hydrodenitrogenation of quinoline and the hydrogenation of tetralin, naphthalene, and butylbenzene. Results are discussed in terms of competitive adsorption. DOE

N92-12092# Ames Lab., IA.
REDUCED MOLYBDENUM OXIDATION STATES IN HYDRODESULFURIZATION CATALYSIS BY CHEVREL PHASES Ph.D. Thesis
M. E. Ekman Jul. 1991 216 p
(Contract W-7405-eng-82)
(DE91-018168; IS-T-1412) Avail: NTIS HC/MF A10

The catalytic activities of reduced (relative to Mo(4+)) molybdenum sulfides, known as Chevrel phases, have been evaluated for thiophene and benzothiophene hydrosulfurization (HDS) and 1-butene hydrogenation (HYD). These materials have been found to have HDS activities comparable to, or greater than, model unpromoted and cobalt promoted MoS2 catalysts; in contrast, Chevrel phases exhibit low activities for 1-butene HYD. X ray powder diffraction and laser Raman spectroscopy analysis of the used (10 hours of thiophene reaction) catalysts indicated that the bulk structures were stable under reaction conditions. XPS analysis demonstrated that reduced molybdenum oxidation states were present at the surface, compared to the Mo(4+) state of the MoS2 catalysts. The effect of the oxidation state of molybdenum on the catalytic HDS of thiophene was investigated using a series of lead-lutetium Chevrel phases with compositions of Lu(1.2x)PbMo6S8 for 0 less than or = x less than or = 0.2, and Lu(1.2x)Pb(1-x)Mo6S8 for 0.2 less than x less than or = 1. These same materials were used to evaluate the chemisorption of O2 and NO as probe molecules of catalytically active sites. DOE

N92-12093# Language Services, Knoxville, TN.
DETERMINATION OF DIFFUSION COEFFICIENTS IN LIQUIDS USING THE DIAPHRAGM CELL METHOD Ph.D. Thesis
Norbert Schoen (Karlsruhe Univ., Germany, F.R.) 1991 128 p Transl. into ENGLISH of German thesis, 17 Dec. 1986 p 1-131 Prepared for ORNL, TN
(Contract DE-AC05-84OR-21400)
(DE91-018403; ORNL/tr-91/6) Avail: NTIS HC/MF A07

Diffusion coefficients in liquids are usually very highly dependent on concentration. In general, it is not possible either to predict the boundary diffusion coefficients (diffusion coefficients with great dilution of one component) or to describe the concentration dependence of the diffusion coefficients in the mixture. Therefore, they must be determined experimentally. A suitable method for this purpose is measurement using a Stokes diaphragm cell. The basic idea of this method consists in placing the entire diffusion resistance in a diaphragm, which separates two liquid mixtures of different concentration from one another. In the present study, the binary diffusion coefficients of the isopropanol-glycerol and water-glycerol systems in the concentration range of 0-100 mol percent glycerol shall be measured at two temperatures between 20 and 50 C. The test results shall be compared with the semi-empirical equations known from the literature. DOE

N92-12094# China Nuclear Information Centre, Beijing.
QUICK SEPARATION AND DETERMINATION OF Pm-147 IN WATER BY HDEHP-KeL-F CHROMATOGRAPHY
Yizhong Qiang, Weiming Shen, Nuping Pu, and Qiaozhen Li Nov. 1989 6 p In CHINESE; ENGLISH summary
(DE91-628873; CNIC-00383; SMC-0043) Avail: NTIS HC/MF A02

A method for the quick separation and determination of Pm-147 in water is reported. Samples of water are separated by stepwise elution with HDEHP-KeL-F chromatographic technique and extraction with liquid-scintillation extractant. Pm-147 is separated from other radionuclides and is determined by liquid scintillation counter. The recovery rate for Pm-147 is 88.5 plus or minus 1.1 percent. The DF for radioactive Sr, Y, Cs, Ru, Zr and Nb is above 10(exp 3), that for radioactive Eu is 10(exp 2), and that for Ce-144 is about 10. The lower limit of detection for Pm-147 is 0.08Bq. DOE

26 METALLIC MATERIALS

Includes physical, chemical, and mechanical properties of metals, e.g., corrosion; and metallurgy.

N92-12095# Lawrence Livermore National Lab., CA.
MILLION-ATOM PLANE-STRAIN INDENTATION STUDIES VIA NONEQUILIBRIUM MOLECULAR DYNAMICS
W. G. Hoover and C. G. Hoover Apr. 1990 4 p Presented at the 3rd Workshop on Molecular Dynamics, Kyoto, Japan, 24-26 Jan. 1990
(Contracts W-7405-eng-48; W-7405-eng-36)
(DE90-012075; UCRL-JC-103890; CONF-900196-1) Avail: NTIS HC A01

The long standing but still-urgent need for a fundamental understanding of plastic flow in precision engineering processing, together with the rapidly developing promise of inexpensive transputer technology, motivated us to undertake this ongoing basic study of plastic deformation. We are simulating the indentation of metals in plane strain in order to elucidate the size-dependence, rate-dependence, and temperature-dependence of the underlying irreversible constitutive relations. The simulations considered here cover a range of sizes from fifty to more than one million atoms. We used networked single-processor computers to develop a 64-transputer simulation program for the SPRINT at Livermore. The SPRINT provides the computational speed of a CRAY at 1/1000 the cost. DOE

N92-12096# Oak Ridge National Lab., TN.
WELDABILITY OF IRON ALUMINIDES
S. A. David, T. Zacharia, and R. W. Reed 1990 7 p Presented at the 4th Conference on Fossil Energy Materials, Oak Ridge, TN, 15-17 May 1990
(Contract DE-AC05-84OR-21400)
(DE90-012722; CONF-900546-10) Avail: NTIS HC/MF A02

A preliminary investigation was carried out to determine the weldability of a class of advanced iron aluminides. Thin sheets of iron aluminides were gas tungsten arc (GTA) and electron beam (EB) welded at different travel speeds and power levels. The results indicate that the weldability of these alloys is very sensitive to the welding conditions and compositions, producing good welds sometimes and severely cracked welds at other times. Alloys containing TiB2 additions for improved strength and ductility cracked severely upon welding. Alloys without boron and zirconium, in particular alloy FA-129, was found to show more promise for welding than most of the other iron aluminides. DOE

N92-12097# Oak Ridge National Lab., TN.
DEVELOPMENT OF SURFACE TREATMENTS AND ALLOY MODIFICATIONS FOR CORROSION-RESISTANT OXIDE SCALES
J. H. DeVan 1990 13 p Presented at the 4th Conference on Fossil Energy Materials, Oak Ridge, TN, 15-17 May 1990
(Contract DE-AC05-84OR-21400)
(DE90-012723; CONF-900546-11) Avail: NTIS HC A03

Alloys based on the long-range ordered system Fe3Al are under development at Oak Ridge National Laboratory in support of coal conversion and combustion materials requirements. Of particular interest is the performance of these alloys in coal gasifiers involving product gases with relatively low oxygen activities and high sulfur activities. Using H2S-H2-H2O gas mixtures, several experimental iron-aluminum alloys have been tested to assess the effects of aluminum concentration on oxidation-sulfidation response at 700 to 800 C in a simulated gasifier environment. Metallographic and chemical analyses of the corrosion product scales and the underlying alloy were performed to determine the

role of respective metallic elements on the sulfidation-oxidation processes. These results, together with thermogravimetric analyses, are discussed in terms of the apparent corrosion mechanisms and optimization of alloy composition for exposure to coal derived environments. More recently, the corrosion performance of an Fe(28)Al(2)Cr alloy has been evaluated in gases produced by an operating gasifier. The reaction products and scale morphologies under actual service conditions were generally similar to the laboratory test results except for the presence of an ash deposit on the gasifier specimens. DOE

N92-12098# Oak Ridge National Lab., TN.
CRYOGENIC TESTING OF FLUOROPOLYMER-COATED STAINLESS STEEL TUBING
J. B. Dooley Nov. 1989 20 p
(Contract DE-AC05-84OR-21400)
(DE90-008022; ORNL/ATD-20) Avail: NTIS HC/MF A03

Stainless steel tubing coated internally with two different types of fluorinated polymers were subjected to microscopic examination after a welding operation had been performed on the tubing. The welded assemblies were photographed and subjected to repeated cycles between liquid helium and room temperature. The green tetrafluoroethylene (TFE) coating peeled back in the area subjected to welding heat and displayed cracking all over its surface without regard to proximity to the weld area. The dark fluorinated ethylene propylene (FEP) coating showed a tendency to char or burn away progressively in the weld area. The dark (FEP) coating did not crack as extensively as the green TFE coating, but did show a few areas of crazing or cracking of the topmost surface after cryogenic exposure. DOE

N92-12099# Central Research Inst. of Electric Power Industry, Tokyo (Japan). Energy and Environment Lab.
STRENGTH EVALUATION FOR MODIFIED 12Cr STEEL AND A286 STEEL OF USC TURBINE ROTOR MATERIALS
Takashi Ogata and Akito Nitta 1990 38 p In JAPANESE; ENGLISH summary
(DE90-503033; CRIE-T-88082) Avail: NTIS (US Sales Only) HC A03

As candidate materials of the ultra super critical (USC) turbine rotor in a coal fired power plant, the modified 12Cr steel and A286 steel are subjects of the study under the first step steam condition (316 atg, 593 C) and under the second step steam condition (350 atg, 650 C), respectively. The strength evaluation tests of the modified 12Cr steel, untreated material, and aging (630 C, 4860 hours) of material 1 were conducted previously, and obtained a prospect that the material could be applied to the first step turbine rotor. In this report, the strength evaluation tests and microstructure observation of the long period aging (630 C, 8190 hours) of material 2 and the strength tests of the A286 steel have been conducted. As a result, it was found that the modified 12Cr steel is a stable material in the microstructure and has enough strength characteristics to apply the first step rotor, and that the A286 steel also can be applied to the second step rotor. DOE

N92-12100# Oak Ridge National Lab., TN.
DESIGNING PRECIPITATION-STRENGTHENED IRON-ALUMINIDES FOR HIGH-TEMPERATURE APPLICATIONS
P. J. Maziasz, C. G. McKamey, and C. R. Hubbard 1990 11 p Presented at the Spring Meeting of the Materials Research Society, San Francisco, CA, 16-21 Apr. 1990
(Contract DE-AC05-84OR-21400)
(DE90-013832; CONF-900466-71) Avail: NTIS HC/MF A03

A combination of minor solutes was added to an Fe3Al-type base alloy (Fe-(28)Al-(6)Cr-(0.05)B) to produce carbide precipitates. These solutes reacted to produce coarse Ti-rich MC and Cr- and Mo-rich M6C precipitates during fabrication at 650 to 1000 C. X ray diffraction of hot worked material revealed a significant amount of the higher temperature B2 phase is retained at room temperature, indicating that the D03 (reversible reaction) B2 phase transformation was retarded. During subsequent heat treatments, the coarse carbides partially dissolved during annealing at 1100 to 1200 C, and no grain coarsening was observed at temperatures up to 1200 C. Specimens annealed for 1 h at 1250 C and quenched exhibited fine carbide precipitates both along some of the dislocations and at grain boundaries. The annealed and quenched specimens also contained many fine dislocation loops which coarsened and evolved into networks during further aging at 750 C for 1 to 10 h. Tensile testing at 600 C showed improvements in strength and ductility of annealed and aged material relative to the hot-worked condition. Correlation of microstructural behavior with tensile properties changes supports the idea that microstructural control can be used to develop better high temperature strength in the B2 phase. However, more data is needed on the combinations of alloying and heat treating which produce fine, stable matrix carbide dispersions in iron-aluminides. DOE

N92-12101 Michigan Univ., Ann Arbor.
THE ACOUSTIC EMISSION CHARACTERISTICS OF SOLIDIFICATION AND FORMATION OF CASTING DEFECTS IN ALUMINUM ALLOY 319 Ph.D. Thesis
Andrew Lee Purvis 1991 219 p
Avail: Univ. Microfilms Order No. DA9124083

Acoustic emission activity during solidification of a restrained bar test casting configuration for aluminum alloy 319 was investigated. Extending the length of the restrained bar from 11 to 14 inches resulted in a range of severities for hot tearing and hot cracking defects. The defect levels and severities were verified through computational techniques, and microstructural examination and analysis. The acoustic emission activity was monitored during this solidification process for castings poured in both green and dry sand molds. Upon subsequent analysis of acoustic emission signals generated during solidification, trends in acoustic emission activity were observed. The relative size, duration times, and energy of signals were investigated as to their statistical significance to defects levels and severities. These results were characterized with respect to specific solidification and defect events in the form of numerical relationships. Pattern recognition techniques were applied to the frequency characteristics of signals. A number of source classes of these signals were identified and analyzed with respect to solidification and defect event generation, and the condition of the molding sand. Linear discriminant functions were developed based on the statistical differences in the spectral characteristics of these signals and a number of trends and signatures were observed. The limitations of the analysis were noted and the errors were attributed to data scatter and the simultaneous generation of acoustic emission signals for a number of these sources. The successful characterization of a number of trends regarding acoustic emission activity, and specific solidification and defect events permits identification of the events based on their resulting signal characteristics. Dissert. Abstr.

N92-12102 ESDU International Ltd., London (England).
FATIGUE CRACK PROPAGATION RATES OF EXPERIMENTAL ALUMINUM LITHIUM SHEET AND PLATE ALLOYS
Aug. 1991 46 p
(ESDU-91015; ISBN-0-85679-777-4; ISSN-0958-0387) Avail: ESDU

Crack propagation rate curves are presented plotted against stress intensity factor range for various values of stress ratio of the alloys 2090, 2091, 8090, and CP 271 in unclad form and with various tempers. The majority of data relate to behavior in air, but some are for high humidity air, distilled or salt water, or dry argon environments. All the data are for long crack under constant amplitude loading. The performance of the alloys is compared with that of more conventional aluminum alloys and the effects of stress ratio and environment are briefly discussed. Author

N92-12103# Technische Univ., Eindhoven (Netherlands).
THE INTERACTION OF SiC WITH Fe, Ni, AND THEIR ALLOYS Ph.D. Thesis
Reinier Christiaan J Schiepers 1991 125 p Sponsored by Ministerie van Economische Zaken s'Gravenhage
(ETN-91-90137) Avail: NTIS HC/MF A06

Diffusion bonding between SiC and metals based on Ni or Fe

is studied from a thermodynamic and kinetic point of view. In solid state diffusion couples the reactions in the temperature range 700 to 1035C are studied. In SiC-Ni couples the phases Ni2Si, Ni5Si2, and Ni3Si are formed. The carbon is present as precipitates in regular bands in the Ni2Si and Ni5Si2 layers. In SiC-Fe couples the layers consist of alpha-(Fe, Si) with random carbon precipitates. The interaction between SiC and steel 316 is investigated. The kinetics of Fe, Ni, Cr and Mo silicides and Cr and Mo carbides are studied. Some experiments on the interaction between silicon nitride and nickel or iron, where the partial nitrogen pressure is of importance, are carried out. To join silicon carbide with metals, interlayers are needed which can cope with the thermal expansion mismatch between SiC and the metals. These interlayers should also decrease the severe reactions between the ceramic and the metals. ESA

N92-12104# Bhabha Atomic Research Centre, Bombay (India).
CURRENT PROGRAMMES OF METALLURGY DIVISION, 1991
1991 17 p
(DE91-634904; BARC-1538) Avail: NTIS HC/MF A03

Current research and development programs of the Metallurgy Division are listed under the headings: Thrust Areas, High Temperature Materials Section, Chemical Metallurgy Section, Metallurgical Thermochemistry Section, Physical Metallurgy Section, Mechanical Metallurgy Section, Corrosion Metallurgy Section, Electrochemical Science and Technology Section, Ceramics Section, and Fabrication and Maintenance Group. A list of equipment in the Division and a list of scientific personnel of the Division are also given. DOE

N92-12105# National Research Council of Canada, Ottawa (Ontario). Structures and Materials Lab.
METALLIC CORROSION: CAUSES AND CASE HISTORIES
W. Wallace 20 Sep. 1990 68 p Presented at the Short Course on Failure Analysis, Doha, Quatar, Oct. 1990
(IAR Proj. 07317; IAR Proj. 07344)
(NRC-LTR-ST-1798; CTN-91-60248) Copyright Avail: NTIS HC/MF A04

Metallic corrosion is described as an electro chemical process and the common forms of corrosion observed in metallic structures and components are described. Examples are provided of uniform corrosion, galvanic or dissimilar metal corrosion, filiform corrosion, intergranular corrosion, stress corrosion cracking, crevice corrosion, corrosion fatigue, fretting, and microbiological corrosion. An expanded section is included on hydrogen induced cracking because of its importance to the on-shore and off-shore oil and gas industries. Author (CISTI)

N92-12106# National Research Council of Canada, Boucherville (Quebec). Chemistry and Corrosion Group.
I.S.O. INTERNATIONAL PROGRAM ON THE STUDY OF ATMOSPHERIC CORROSION: RESULTS OF FIRST YEAR EXPOSURE AT BOUCHERVILLE, OCTOBER 1986 - OCTOBER 1987
Jean-Jacques Hechler Feb. 1988 25 p
(NRC-28896; NRC-IGM88RT-202-715-G; CTN-91-60282)
Copyright Avail: NTIS HC/MF A03

Canada is a participant in an International Standards Organization (ISO) study of atmospheric corrosion with the ultimate goal of developing standards for the determination of atmospheric corrosion. This report describes activities and preliminary results of the first year of a study of atmospheric corrosion of metals carried out at Boucherville, Quebec. Flat and helically shaped specimens of zinc, aluminum, steel, and copper were exposed outdoors for a year. Environmental parameters monitored included temperature, relative humidity, chloride and sulfate deposition rates, and time of wetness. Weight loss due to corrosion was recorded for all samples. Changes in electrical resistance were monitored for copper and steel samples. CISTI

N92-12107# National Research Council of Canada, Boucherville (Quebec). Industrial Materials Research Inst.
AGEING CHARACTERISTICS OF DENDRITIC AND NON-DENDRITIC (STIR-CAST) Zn-Al ALLOY (ZA-27)
H. LeHuy and G. LEsperance (Ecole Polytechnique, Montreal, Quebec) 1988 38 p
(NRC-28906; CTN-91-60297) Copyright Avail: NTIS HC/MF A03

The zinc-aluminum alloy, ZA-27, exhibits attractive physical and mechanical properties combined with good friction and wear resistance properties making it a choice alloy for a multitude of end-use applications. Some of these applications require increased performance of the alloy at high temperature, in particular dimensional stability. Dimensional changes of both dendritic and non-dendritic (spheroidized) stir-cast alloys were followed at different holding temperatures varying from room temperature to 245 C. Their microstructural changes were studied by scanning and transmission electron microscopy. Results showed that the linear expansion of ZA-27 on ageing could be minimized in stir casting by promoting the formation of a stable alpha phase. Phase transformation of as-cast ZA-27 alloy during isothermal treatment is the resultant process of decomposition of several supersaturated phases. In the first stage, the FFC aluminum-rich phase decomposes into the equilibrium eta and alpha phases. This investigation shows this decomposition reaction to be a short term transformation, inducing a slight contraction when the cast material is cooled down and/or in the early stages of ageing. The long term phase transformations, which produce dimensional growth, are associated with the formation of an equilibrium tau prime phase in the interdendritic (or interparticle) phases and to the reduction of copper content in solution in the Zn-rich phase. In stir-cast material, the dimensional growth is slightly lower than that of conventionally cast material. It is tempting to associate this behavior with the presence of more stable phases in primary particles and in the beta constitutent. CISTI

N92-12108# Messerschmitt-Boelkow-Blohm G.m.b.H., Munich (Germany, F.R.). Central Lab.
PVD LAYERS FOR CORROSION PROTECTION OF HIGH STRENGTH Al-ALLOYS
U. Koch and M. Meyer 1991 23 p Presented at Intercorr, Berlin, Fed. Republic of Germany, 18 Mar. 1991
(MBB-Z-0360-91-PUB; OTN-033073; ETN-91-90188) Avail: NTIS HC/MF A03

Magnetron sputtering, a versatile and innovative coating technique for producing many kinds of different thin material layers on almost any kind of substrates (plastics, ceramics, metals), is discussed. The problem of the directed particle flow sputter coating on three dimensional components with less accessible areas is demonstrated. Sputtering into holes is very difficult and can hardly be influenced by process parameters and substrate motion; however, sputtering on edges, bevels and on larger components is nearly homogenous if substrate motion is performed. As an example, pure Al and Al Zn coatings were sputtered on flat Al 2024 and Al 7475 substrate materials. Their corrosion behavior was tested by alternate immersion tests, electrochemical measurements, EDX analysis and metallographic cross sections. The adhesion and the columnar structure of the layers were examined and were found to be the main phenomena influencing corrosion. ESA

N92-12109# Oak Ridge National Lab., TN.
EVALUATION OF THE FABRICABILITY OF ADVANCED AUSTENITIC TUBING
Mark J. Topolski (Babcock and Wilcox Co., Alliance, OH.) Mar. 1991 85 p
(Contract DE-AC05-84OR-21400)
(DE91-017158; ORNL/Sub-88-SB775/02) Avail: NTIS HC/MF A05

The U.S. Department of Energy Advanced Research and Technology Development (AR&TD) Fossil Energy Materials Program in 1986 began a six-year activity to investigate candidate alloys for advanced steam cycle superheaters and reheaters. The

specific advanced austenitic alloys of interest were defined through a screening program which assessed strength and metallurgical stability within the temperature range of 650 to 760 C. One task in the program addresses the fabrication of tubing from alloys containing controlled amounts of MC-carbide forming additions and the cladding or surface treating of tubing for optimum corrosion resistance. These alloys are members of a family of HT-UPS (high-temperature, ultrafine precipitate) austenitic alloys. Under the current research effort, a heat of 20Cr-30Ni-Mo (m800H) was successfully melted, cast, and hot rotary forged into billet stock. Hot extrusion of wrought monolithic and alloy 690 and 671 clad m800H and LSS was demonstrated. Furthermore, cold tube-reducing of monolithic and alloy 690 clad m800H and LSS was successfully demonstrated. Alloy 671 clad composite hollows, however, could not be cold reduced because of a blocky carbide discontinuous network at the interface. Monolithic and alloy 690 clad m800H and LSS tubes were solution treated at 2175 F (1190 C) and 5 to 10 percent cold worked. Weld cladding of m800H and LSS with alloy 690 or MIG72 was successfully demonstrated. LSS was also chromize surface-treated during this research effort. And, four laboratory heats of LSS and m800H were modified to yield improved heat-affected zone liquation cracking resistance. DOE

N92-12110# EG and G Rocky Flats, Inc., Golden, CO.
THE EDM SURFACE: TOPOGRAPHY, CHEMISTRY, AND METALLURGY
J. E. Fuller 1991 14 p Presented at the Society of Manufacturing Engineers (SME) Electric Discharge Machining (EDM) Clinic, Grand Rapids, MI, 17 Sep. 1991
(Contract DE-AC34-90DP-62349)
(DE91-017756; RFP-4498; CONF-9109247-1) Avail: NTIS HC/MF A03

The surface created by the electric discharge machining (EDM) process is of special interest because it has been shown to have a negative effect on the fatigue properties of many alloys. An understanding of the surface metallurgy and chemistry is important in predicting those alloys which are most susceptible to failure. Remedial actions, including thickness minimization, alteration, or removal of the surface layer are addressed. DOE

N92-12111# Sandia National Labs., Albuquerque, NM.
GOLD SULFIDE REPLACEMENTS OF CYANIDE SOLUTIONS
W. Worobey, D. Norwood, and D. Rieger 1991 10 p Presented at the 1st International Congress on Environmentally Conscious Manufacturing, Santa Fe, NM, 18 Sep. 1991
(Contract DE-AC04-76DP-00789)
(DE91-017981; SAND-91-1509C; CONF-9109259-1) Avail: NTIS HC/MF A02

At Sandia National Laboratories we have introduced a non-cyanide gold electroplating solution in the Solid State Circuit Processing Lab. This commercially available solution is based on gold sulfite salts. An evaluation of the plating bath and the deposited gold for use in microelectronic circuit fabrication was conducted. The tests included selective plating compatibility, wire bonding, soldering, gold resistivity, adherence, and step coverage. The results were all favorable. Precision gold patterns with line widths as small as 2 micron and gold thickness over 4 micron were selectively plated using a positive photoresist as a plating mask. Also the gold sulfite solution was used to fabricate gold air bridge crossovers for GaAs circuits. The introduction of the non-hazardous sulfite solution for plating high purity gold films will lead to manufacturing processes which are safer to work with and less damaging to the environment. DOE

N92-12112# Oak Ridge National Lab., TN.
CREEP IN L1(2)-INTERMETALLICS
J. H. Schneibel and P. M. Hazzledine (Oxford Univ., England) 1991 17 p Presented at the NATO Advanced Research Workshop, Irsee (Germany), 23-29 Jun. 1991
(Contract DE-AC05-84OR-21400)
(DE91-018231; CONF-9106275-2) Avail: NTIS HC/MF A03

Several intermetallic compounds with the L1(2) structure exhibit a yield strength anomaly (YSA), i.e., the yield stress increases as the temperature increases. As shown for Ni3Al, no corresponding creep strength anomaly exists. The creep strength decreases in a normal manner with increasing temperature. Its orientation dependence is different from that observed in the YSA regime. The transient creep of Ni3Al is composed of a normal work hardening and an inverse work softening part. The reasons for such transients are discussed. Specific models for the dependence of strain rate vs. strain during inverse creep as well as for the orientation dependence of the creep strength are reviewed and compared with experiments. Experiments and models indicate that the strain rate, var epsilon, depends on the strain, var epsilon approx. as var epsilon or var epsilon exp 2/3. The orientation dependence of the creep strength is particularly pronounced at low temperatures and changes at high temperatures and low stresses. At low creep stresses, Ni3Al is not as strong as high strength superalloys, due to its low stress exponent. However, further optimization may be possible. As to the creep of other L1(2) compounds, very little information is available and no distinct evidence for inverse creep has been found. This may be due to the lower yield stresses and less pronounced YSA in these compounds. DOE

N92-12113# Lawrence Livermore National Lab., CA.
ELECTROLESS VS ELECTRODEPOSITED Ni-P ALLOYS FOR DIAMOND TURNING APPLICATIONS
J. W. Dini Jul. 1991 20 p Presented at the Electroless Nickel '91, Orlando, FL, 20-22 Nov. 1991
(Contract W-7405-eng-48)
(DE91-018999; UCRL-JC-107839; CONF-911197-1) Avail: NTIS HC/MF A03

Electrolytes nickel deposits with greater than 10 percent phosphorous have been widely used for diamond turning applications such as fabrications of large optics and other high precision parts. Although the coatings have worked well, they are not without their drawbacks. Porosity and nodule formation have been problems as well as the difficulty of obtaining deposits greater than about 75 microns. In recent years much effort has been directed at the investigating electrodeposition of Ni-P alloys in an attempt to avoid these problems. The purpose of this paper is to compare diamond turning results for both electroless and electrodeposited alloys and speculate about the future uses of electrodeposited Ni-P for precision finishing applications. DOE

N92-12114# China Nuclear Information Centre, Beijing.
THE EFFECT OF WORKING PROCESS ON HYDROGENATE ORIENTATION OF Zr-4 ALLOY TUBE
Peicheng Lu, Xueweng Tong, Shizhong Yang, Zhenye Tian, and Guangsheng Wang Oct. 1989 8 p In CHINESE; ENGLISH summary
(DE91-629474; CNIC-00354; NFMW-0001) Avail: NTIS HC/MF A02

The hydrogenate orientation in Zr-4 alloy tubes affected by the hot-work, cold rolling and annealing of end-product tubes has been studied. The results show that the hydrogenate orientation factor of annealed end-product tubes formed by quenched ingots is smaller than those made of direct extruding of ingots. There is no remarkable difference of hydrogenate orientation factor between four cold rolling processes adopted in the experiments. The hydrogenate orientation factor could be very small, if an appropriate process is taken. The distribution of hydrogenates is almost in peripheral. For the end-products in the existing process, the hydrogenate orientation factor at the out side of tube wall is higher than at the inside of tube wall. DOE

N92-12115# Comision Nacional de Energia Atomica, Buenos Aires (Argentina). Dept. de Desarrollo de Procesos.
CORROSION UNDER STRESS OF AISI 304 STEEL IN THIOCYANATE SOLUTIONS [CORROSION BAJO TENSION DE ACERO INOXIDABLE 304 EN SOLUCIONES DE TIOCIANATO]
P. M. Perillo and G. S. Duffo 1989 29 p In SPANISH
(DE91-631523; CNEA-D-DP-FQP-109) Avail: NTIS HC/MF A03

Corrosion susceptibility under stress of AISI 304 steel sensitized

in a sodium thiocyanate solution has been studied and results were compared with those obtained with solutions of thiosulfate and tetrathionate. Sensitized steel type 304 is highly susceptible to corrosion when under intergranular stress (IGSCC) in thiocyanate solutions but the aggressiveness of this anion is less than that of the other sulphur anions studied (thiosulfate and tetrathionate). This work has been partly carried out in the Chemistry Department. DOE

N92-12116# Lawrence Livermore National Lab., CA.
DUCTILE-BRITTLE TRANSITION TEMPERATURE TESTING OF TUNGSTEN USING THE THREE-POINT BEND TEST
D. H. Lassila, F. Magness, and D. Freeman Mar. 1991 18 p
(Contract W-7405-eng-48)
(DE92-000099; UCRL-ID-108258) Avail: NTIS HC/MF A03

Three-point bend tests were performed to determine the Ductile-Brittle Transition Temperatures (DBTTs) of forged and chemical vapor deposition (CVD) tungsten. Testing was performed under quasistatic conditions at temperatures between 23 and 450 C using a forced-air environmental chamber. Load displacement data from the three-point bend tests indicated that the constitutive behavior of the materials tested varied considerably. Finite element modeling of the three-point bend test was performed to investigate plastic strains induced in the samples during testing as a function of constitutive behavior. The modeling assumed plane stress conditions in the sample and simple bi-linear elastic-plastic constitutive behavior of the test material. The strains induced in the samples were found to be functions of both the yield stress and work hardening behavior of the materials. The use of the three-point bend test to determine DBTT, and the DBTTs reported for the test materials, are discussed relative to the modeling results. It is concluded that the three-point bend test has some utility in the determination of DBTTs if some caution is used in the selection of test parameters and fixture geometries. However, the three-point bend test does not provide a complete picture of the nature of the ductile-brittle transition. DOE

N92-12117# Los Alamos National Lab., NM.
SYNTHESIS OF Al/Al3Ti TWO-PHASE ALLOYS BY MECHANICAL ALLOYING
S. Srinivasan, S. R. Chen, and R. B. Schwarz 1991 18 p Presented at the International Conference on High Temperature Aluminides and Intermetallics, San Diego, CA, 17-19 Sep. 1991
(Contract W-7405-eng-36)
(DE92-000193; LA-UR-91-3051; CONF-910938-2) Avail: NTIS HC/MF A03

We have mechanically alloyed mixtures of elemental powders to prepare fine-grain two-phase Al/Al3Ti powders at the compositions Al-20 at percent Ti and Al-10 at percent Ti. Hexane was used to prevent agglomeration of the powder during MA. Carbon from the decomposition of the hexane was incorporated in the powder. It reacted with Ti to form a fine dispersion of carbides in the final hot-pressed compact. We consolidated the mechanically alloyed powders by hot-pressing. Yield strength and ductility were measured in compression. At 25 C, the compressive yield strengths were 1.25 and 0.6 GPa for the Al-20 at percent Ti and Al-10 at percent Ti alloys, respectively. The ductility of the Al-10 at percent Ti alloy exceeded 20 percent for 25 T 500 C. DOE

N92-12118# Oak Ridge National Lab., TN.
THE EFFECT OF CASTING TEMPERATURE ON THE FATIGUE PROPERTIES OF CAST NICKEL ALUMINIDE ALLOYS
B. Gieseke and V. K. Sikka 1991 15 p Presented at the International Conference on High Temperature Aluminides and Intermetallics, San Diego, CA, 17-19 Sep. 1991
(Contract DE-AC05-84OR-21400)
(DE92-000432; CONF-910938-3) Avail: NTIS HC/MF A03

The results of high cycle fatigue tests at 650 C on several cast Ni3Al alloys are reported and compared to cast IN-713C. These alloys include IC-221M and several variations to the IC-221M composition. The effect of casting temperature is investigated using castings poured at three different temperatures spanning a 56 C range. The results show that IC-221M cast at the highest temperature has the best fatigue strength, exceeding that for IN-713C. In these alloys, crack initiation occurs at shrinkage microporosity and the effect of casting temperature on porosity is related to the observed differences in fatigue lives. DOE

27 NONMETALLIC MATERIALS

Includes physical, chemical, and mechanical properties of plastics, elastomers, lubricants, polymers, textiles, adhesives, and ceramic materials.

For composite materials see *24 Composite Materials*.

N92-12119# Sandia National Labs., Albuquerque, NM.
CONTROLLED MICROSTRUCTURE OXIDE COATING FOR CHEMICAL SENSORS
G. C. Frye, C. J. Brinker, C. S. Ashley, S. L. Martinez, and T. Bein (New Mexico Univ., Albuquerque.) 1990 17 p Presented at the Solid State Sensor and Actuator Workshop, Hilton Head Island, 4-7 Jun. 1990
(Contract DE-AC04-76DP-00789)
(DE90-012223; SAND-90-1078C; CONF-9006171-2) Avail: NTIS HC/MF A03

We have investigated the use of porous oxide coatings, formed using sol-gel chemistry routes, as the discriminating elements of acoustic wave (AW) chemical sensors. These coatings provide several unique advantages: durability, high adsorption capacity based on large surface areas, and chemical selectivity based on both molecular size and chemical interactions. The porosity of these coatings is determined by performing nitrogen adsorption isotherms using the AW device response to monitor the uptake of nitrogen at 77 K. The chemical sensitivity and selectivity obtained with this class of coatings will be demonstrated using several examples: hydrous titanate ion exchange coatings, zeolite/silicate microcomposite coatings, and surface modified silicate films. DOE

N92-12120# Argonne National Lab., IL.
MOLTEN CARBONATE FUEL CELL RESEARCH
J. L. Smith, A. P. Brown, and G. H. Kucera 1990 10 p Presented at the METC Contractors Review Meeting, Morgantown, 2-3 May 1990
(Contract W-31-109-eng-38)
(DE90-013896; CONF-9005195-2) Avail: NTIS HC/MF A02

The emphasis of this project is to develop new electronically conductive ceramic materials that are chemically and polymorphically stable in molten carbonate fuel cell (MCFC) environments and to test these materials as MCFC components (i.e., electrodes and separator sheets). this quarter, the electric conductivity of undoped and niobium-doped LiFeO2 and undoped MnO was measured. Also, methods to increase the surface area of the cathodes is discussed. DOE

N92-12121*# National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.
A PROCESS FOR PREPARING AN ASSEMBLY OF AN ARTICLE AND A SOLUBLE POLYIMIDE WHICH RESISTS DIMENSIONAL CHANGE, DELAMINATION, AND DEBONDING WHEN EXPOSED TO CHANGES IN TEMPERATURE Patent Application
Diane M. Stoakley, inventor (to NASA) and Anne K. St.Clair, inventor (to NASA) 26 Jul. 1991 14 p
(NASA-CASE-LAR-14763-1; NAS 1.71:LAR-14763-1; US-Patent-Appl-SN-736667) Avail: NTIS HC/MF A03 CSCL 11C

An assembly of an article and a polyimide is prepared. The assembly resists dimensional change, delamination, or debonding when exposed to changes in temperature. An article is provided. A soluble polyimide resin solution having a low coefficient of thermal expansion (CTE) was prepared by dissolving the polyimide in solvent and adding a metal ion-containing additive to the solution.

Examples of the additive are: Ho(OOCCH3), Er(NPPA)3, TmCl3, and Er(C5H7O2)3. The soluble polyimide resin is combined with the article to form the assembly. NASA

N92-12122# Technische Univ., Eindhoven (Netherlands).
ELECTRON BEAM IRRADIATION OF POLYMER BLENDS Ph.D. Thesis
Josephus Gerardus Ma vanGisbergen 26 Feb. 1991 154 p
(ETN-91-90139) Avail: NTIS HC/MF A08

Results concerning the modification of immiscible polymer blends by Electron Beam (EB) irradiation are presented. An enhanced stability of a highly nonequilibrium morphology could be achieved by irradiation in the model system of relatively inert polystyrene and crosslinkage polyethylene. The possibility of toughening of polypropylene with EPDM rubber by EB is investigated. A rheological analysis over large shear rates of polypropylene EPDM blends reveals that irradiation results in a decrease in viscosity at high shear rates. Irradiation of a polystyrene EPDM blend with a styrene butadiene diblock copolymer added as a compatibilizer did not lead to fixation of the morphology during injection molding. Preliminary experiments to study the effects of controlled scission of the dispersed phase of the blend are reported. ESA

N92-12123# National Research Council of Canada, Ottawa (Ontario). Structures and Materials Lab.
PHOTOELASTIC COATING METHOD STRAIN SURVEY OF CRUCIFORM SPECIMEN
J. P. Komorowski 4 Apr. 1990 15 p Prepared in cooperation with Sherbrooke Univ., Quebec
(Contract FE-46-158-86; IAR Proj. 07336)
(NRC-LTR-ST-1747; CTN-91-60260) Copyright Avail: NTIS HC/MF A03

One of the major problems in biaxial testing is to design a cruciform specimen to obtain the desired biaxial state of stress. A new cruciform specimen designed at the University of Sherbrooke and made of A516 grade 70 steel was evaluated. The test involved a strain survey with photoelastic coating. In order to measure strain in the specimen center, a slotted coating technique was employed successfully. The specimen offers a zone where strain is uniform; however, the specimen will most likely fail outside the gauge area. Some non-uniformity of specimen loading was detected and this should be further investigated at the University of Sherbrooke. In parallel with this experimental study, the specimen was modeled at the University of Sherbrooke using the Finite Element Method. In addition, some aspects of the biaxial testing machine performance were evaluated. Author (CISTI)

N92-12124# National Research Council of Canada, Boucherville (Quebec). Industrial Materials Research Inst.
PHYSICOCHEMICAL INVESTIGATION OF THE COMPATIBILIZATION OF POLYOLEFIN/POLYAMIDE BLENDS: MORPHOLOGY, THERMAL ANALYSIS, AND SPECIFIC INTERACTIONS
J. M. Willis and B. D. Favis May 1988 43 p Presented at the 4th Polymer Processing Society Conference, Orlando, FL, May 1988
(NRC-29455; NRC-IGM88AP-102-777-G; CTN-91-60281)
Copyright Avail: NTIS HC/MF A03

Morphological and physicochemical studies of the binary blends of a polyethylene based ionomer with polypropylene, polyethylene and polyamide were undertaken to understand the influence of interfacial modification on the morphology and physical properties of compatibilized polyamide/ionomer/polyolefin ternary blends. A two phase morphology was observed for the binary polyolefin/ionomer blends, while in contrast the fracture surfaces of polyamide/ionomer blends appeared to be homogeneous. Infrared results indicated that a specific interaction exists between the carbonyl groups of the ionomer and the amide groups of the polyamide. This type of interaction was found to be absent between the ionomer and the polyolefins. At low ionomer concentrations, torque measurements displayed positive deviations for the polyamide/ionomer blends while negative deviations were observed for the polyolefin/ionomer blends. The results obtained from non-isothermal differential scanning calorimetry indicated that the ionomer enhanced the nucleation of the polyolefins, but impeded the crystallization of the polyamide. The spectrometric, calorimetric and physical data obtained for these binary blends concur with the morphological observations. This evidence suggests that there are much stronger interactions between the ionomer and the polyamide than between the ionomer and the polyolefins. Author (CISTI)

N92-12125# National Research Council of Canada, Boucherville (Quebec). Industrial Materials Research Inst.
ULTRASONIC INVESTIGATION OF AMORPHOUS POLYMERS (POLYSTYRENE) IN A WIDE RANGE OF TEMPERATURE AND PRESSURE. 1: INTRODUCTION, METHOD, TECHNIQUE, AND RESULTS
L. Piche and F. Massines 1990 92 p
(NRC-29718; NRC-IGM88AP-403-793-G; CTN-91-60283) Avail: NTIS HC/MF A05

The use of ultrasonic techniques for the characterization of thermomechanical properties of polymer solids and melts is described. A method and apparatus for ultrasonic testing of polymers are described and the basis is given for the calculation of the ultrasonic complex modulus from experimentally determined acoustic velocity and attenuation. A brief review of previous work is included. The technique incorporates simultaneous measurement of the dynamic storage and loss moduli together with the specific volume as a means of characterizing the thermodynamic state of the material. The instrument provides close control of thermal parameters at a broad range of temperatures (150 to 600 K) and pressure. The use of the instrument to measure glass transition phenomena in polystyrene is reported. The techniques permits discrimination between thermodynamic and relaxation aspects of glass transition phenomenon. Author (CISTI)

N92-12126# National Research Council of Canada, Boucherville (Quebec). Industrial Materials Research Inst.
MODELLING THE CURE OF NARMCO 5208: A METHOD FOR DETERMINING THE CHEMICAL STATE OF THE PREPREG
K. C. Cole and Denis Noel Sep. 1988 66 p
(NRC-29449; NRC-IGM88RT-101-772-G; CTN-91-60301) Avail: NTIS HC/MF A04

The accurate modelling of the curing process of a thermoset resin system requires that the initial chemical state of the resin be properly characterized. In this work, a method has been developed for the epoxy/amine system Narmco 5208 which enables the use of data obtained by reverse-phase liquid chromatography (RPLC) to calculate the parameters required to describe the state of the resin. This was done by mathematically analyzing the chemical kinetics of the system in order to develop a simplified model relating the RPLC data to the unknown parameters, and then by preparing and analyzing a set of mixtures in order to verify the model and determine the specific numeric factors needed. The two most important parameters involved are the epoxy to hardener ratio and the initial degree of polymerization of the resin, both of which can vary from batch to batch. These are determined with a good degree of accuracy. Because of certain complications associated with the minor epoxy resin, the individual contents of the two epoxy resins present are determined with somewhat less precision. While the exact details of the method are specific to Narmco 5208, the general principles can be applied to other systems provided their chemical composition is known. Author (CISTI)

N92-12127# National Research Council of Canada, Boucherville (Quebec). Industrial Materials Research Inst.
PROCESSING-MORPHOLOGY RELATIONSHIPS OF COMPATIBILIZED POLYOLEFIN/POLYAMIDE BLENDS. PART 1: THE EFFECT OF AN IONOMER COMPATIBILIZER ON BLEND MORPHOLOGY
J. M. Willis and B. D. Favis 1990 45 p
(NRC-29094-Pt-1; NRC-IGM88AP-102-742-G-Pt-1; CTN-91-60305)
Avail: NTIS HC/MF A03

The blending of polymers is an economically viable and versatile way in which new materials can be produced to have a wide range or properties. A study of the blend morphology is of importance because it relates the properties of the blend to the manner in which it was processed. In this paper, the influence of interfacial modification on morphology is studied. The morphology of compatibilized polyolefin/polyamide blends was found to be significantly dependent on the concentration of an ionomer compatibilizer (polyethylene methacrylic acid isobutyl acrylate terpolymer) in the blend. For a dispersed phase content of 10 percent by weight, a maximum reduction in phase size was observed when only 0.5 percent by weight of ionomer was added to the blend. A more significant reduction of the dispersed phase size was observed when the minor phase was nylon, due to interactions which exist between the ionomer and the polyamide. At high concentrations of the ionomer, flocculation of the nylon dispersed phase was observed. In comparison to one-step mixing, blends prepared by two-step or batch mixing were characterized by a smaller dispersed phase when nylon was the matrix, and a larger particle size when nylon was the minor phase. The results observed are explained in terms of a speculative model of the interactions occurring across the nylon polyolefin interface.

Author (CISTI)

N92-12128# National Research Council of Canada, Boucherville (Quebec). Industrial Materials Research Inst.

DETERMINATION OF THE IMPACT FRACTURE PARAMETERS IN DUCTILE POLYMERS

T. Vu-Khanh 1988 28 p

(NRC-28433; NRC-IGM88AP-103-654-G; CTN-91-60307) Avail: NTIS HC/MF A03

This paper presents a new model for the impact fracture characterization of ductile polymers. The model takes into account the energy dissipated in plastic deformation during the crack propagation period. Two material parameters are used in the model; the fracture energy at initiation and an equivalent tearing modulus which represents the variation of the fracture energy as the crack grows. The model was used to measure the impact fracture toughness of a toughened nylon 66 and of a polycarbonate/polyethylene blend. Measurements were made in impact as well as at a low loading rate. The material fracture toughness was also measured by the J-integral method in non-linear fracture mechanics at a low loading rate. The fracture energy at initiation determined from the proposed model is in good agreement with that of the J-integral method. Inconsistency and the negative intercept which result from the conventional method of analysis are also discussed in terms of the two material parameters.

CISTI

N92-12129# Technische Hochschule, Darmstadt (Germany, F.R.). Fachbereich Physik.

FRACTIONAL CRYSTALLIZATION IN POLYMER MIXING Ph.D. Thesis [FRAKTIONIERTE KRISTALLISATION IN POLYMERMISCHUNGEN]

Heino Frensch 1989 109 p In GERMAN

(ETN-91-90184) Avail: NTIS HC/MF A06

Crystallization kinetics in mixtures of incompatible polymer and changed crystallization conditions in dispersed systems are presented. Fractional crystallization in compatible polymers, using selected model systems, is examined. A number of new forms of fractional crystallization were determined in model systems. The way in which intensities and supercooling values of crystallization stages are influenced by mixing concentration, particle size, and existing impurities is examined. Experiments are developed to characterize the dispersion state, e.g., mixing structure and particle size. A thermoanalytical examination of the progress of crystallization, when cooling from the melt, is performed. ESA

N92-12130# Ames Lab., IA.

CHEMICALLY MODIFIED POLYMERIC RESINS FOR HIGH PERFORMANCE LIQUID CHROMATOGRAPHY, SOLID-PHASE EXTRACTION, AND ORGANIC SEPARATION BY LC AND GC Ph.D. Thesis

Jeffrey Jiafang Sun Aug. 1991 204 p

(Contract W-7405-eng-82)

(DE91-018166; IS-T-1572) Avail: NTIS HC/MF A10

Polystyrene divinylbenzene resins were chemically modified by introduction of various functional groups, which included polar, non-polar, ionic and metallic groups. These chemically modified polymeric resins were used successfully for high performance liquid chromatography, solid phase extraction and some special applications in liquid and gas chromatography. The introduced functional groups offer an additional selectivity parameter for liquid chromatographic separation. The polar derivatized polymeric resins dramatically increased the recoveries of solid phase extraction, especially for polar compounds. The sulfonated polystyrene resins were used for separation of neutral and basic compounds as well as basic and weaker basic compounds. The sulfonated non-porous resin was used as an amine abstracter and the polymeric-mercuric resin was used as mercaptan abstracter in capillary gas chromatograph. The researches in this dissertation has shown the very promising applications of polystyrene divinylbenzene resin in chromatographic field. DOE

N92-12131# Oak Ridge National Lab., TN.

MECHANICAL PROPERTIES AND MICROSTRUCTURE OF PRESSURELESS SINTERED DUOPHASE SIALON

Ran-Rong Lee, B. E. Novich, G. Franks, D. Quellette, M. K. Ferber, C. R. Hubbard, and K. More 1991 10 p Presented at the 4th International Symposium on Ceramic Materials and Components for Engines, Geoteborg, Sweden, 10-12 Jun. 1991

(Contract DE-AC05-84OR-21400)

(DE92-000043; CONF-910617-4) Avail: NTIS HC/MF A02

Duophase (alpha prime beta prime) sialon is being developed for ceramic engine applications by using the Quickset(trademark) injection molding process, followed by pressureless sintering and a thermal treatment. The sialon had an average four-point flexural strength of 670 MPa at room temperature and 490 MPa at 1370 C. It survived the flexural stress rupture test at 1300 C and 340 MPa for 190 hours. X ray diffraction (XRD) and transmission electron microscopy (TEM) characterization showed that crystallization of the grain boundary phase improved the high temperature flexural strength of this sialon material. The creep behavior was also found to be affected by the crystallized grain boundary phases. The formation of a yttrium aluminum garnet (YAG) phase and elongated grains yielded better creep resistance. The correlation between mechanical properties and microstructure is discussed. DOE

N92-12132# Pacific Northwest Lab., Richland, WA.

VICKERS MICROINDENTATION TOUGHNESS OF A SINTERED SiC IN THE MEDIAN-CRACK REGIME

Asish Ghosh, A. S. Kobayashi, Zhuang Li, C. H. Henager, Jr., and R. Bradt (Nevada Univ., Reno.) 1991 33 p

(Contract DE-AC06-76RL-01830)

(DE92-000225; PNL-SA-16927) Avail: NTIS HC/MF A03

The Vickers microindentation method for the determination of the fracture toughness of ceramics was investigated in the median crack regime for a sintered alpha SiC. The results are compared with fracture toughness measurements by conventional fracture mechanics technique and also with the reported indentation toughness for the low-load Palmqvist crack regime. Indentation toughnesses in the median crack regime vary widely depending on the choice of the specific equation which is applied. The indentation toughnesses are also load (crack length) dependent. A decreasing R-curve trend results, in contradiction to the flat R-curve that has been observed with conventional fracture mechanics techniques. It is concluded that the Vickers microindentation method is not a reliable technique for the determination of the fracture toughness of ceramics in the median crack regime. DOE

28 PROPELLANTS AND FUELS

Includes rocket propellants, igniters, and oxidizers; their storage and handling procedures; and aircraft fuels.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power,* and *44 Energy Production and Conversion.*

N92-12133# Los Alamos National Lab., NM.
HIGH EXPLOSIVES SKID IMPACT INITIATION STUDY
A. S. Vigil, J. M. Bunch, D. L. Jaeger, P. D. Smith, and E. E. Abeyta Jun. 1990 22 p
(Contract W-7405-eng-36)
(DE90-011266; LA-11789-MS) Avail: NTIS HC/MF A03

The objective of this study was to develop a better quantitative understanding of explosive behavior under skid impact conditions. We evaluated the effects of sample weight, impact velocity, contact surface area at impact, target surface roughness, and target material on the skid impact HE ignition threshold. We also quantified the effects of two parameters that had never been fully investigated in the standard skid impact sensitivity test: explosive sample size and angle of incidence. These parameters were studied experimentally by conducting a series of tests, and analytical, with a number of 1-D, 2-D, and 3-D computer models. This study is the first phase in a program to measure the transient heat produced in the ignition of a high explosive sample as it impacts an infrared (IR) transmissive target. We will use the experimentally derived data to enhance our ability to predict the onset of ignition in impact-heated high explosives. DOE

N92-12134# Oak Ridge National Lab., TN.
ALTERNATIVE MOTOR FUEL USE MODEL: MODEL THEORY AND DESIGN AND USER'S GUIDE
D. L. Greene and A. Rathi (Tennessee Univ., Knoxville.) Mar. 1990 156 p
(Contract DE-AC05-84OR-21400)
(DE90-012040; ORNL/TM-11448) Avail: NTIS HC/MF A08

The Alternative Motor Fuel Use Model (AMFU) is a tool for the analysis and prediction of motor fuel use by highway vehicles. The model advances the art of vehicle stock modeling by including a representation of the choice of motor fuel for flexible and dual fuel vehicles. Part one of the report is a User's Guide to the operation of the model. Part two describes the model's structure and the theory of vehicle stock modeling of energy use on which it is based. The model is designed for IBM PC, PC/XT, PC/AT, PS/2, and compatibles. It is written in compiled BASIC and data input is via automated, menu driven spreadsheets. From within the spreadsheets users can define the dimensions of a forecast, as well as the types of vehicle technologies and the fuels they use. The AMFU Model can be run for one or many vehicle types (e.g., automobiles, light trucks, heavy trucks) simultaneously. The effort required to create the data tables required for a model run is substantial. DOE

N92-12135# Sandia National Labs., Albuquerque, NM.
A SEMI-ANALYTICAL MODEL FOR PRESSURE-TIME HISTORY OF GRANULAR PYROTECHNIC MATERIALS IN A CLOSED SYSTEM
A. Razani, M. Shahinpoor (New Mexico Univ., Albuquerque.), and S. L. Hingorani-Norenberg 1990 15 p Presented at the 15th International Pyrotechnics Seminar, Boulder, CO, 9-13 Jul. 1990
(Contract DE-AC04-76DP-00789)
(DE90-012761; SAND-90-0599C; CONF-900792-7) Avail: NTIS HC/MF A03

Recent experiments with Titanium Subhydride Potassium Perchlorate burning under a zero-volume firing condition have shown that compaction occurs ahead of the burn front. A multiphase flow model can be used to obtain the pressure-time history. However, the number of assumptions on parameters and models must be made to obtain a solution. In this work a semi-analytical model is developed to determine the pressure-time history based on the measured burning front velocity. There are experimental evidence that the burning velocity is a slowly varying function of compaction. It is assumed that the burning particles have a given size distribution and they burn parallel to their outer surface. The burning rate is assumed to be pressure dependent. The penetration of gaseous combustion products into the pores ahead of the burn front and the compaction of the charge can be included by introducing suitable pressure dependent parameters. The formulation of the problem results in an integro-differential equation for the pressure-time history of gaseous combustion products in the close system. This equation is solved numerically to obtain the pressure. A parametric study is performed to find the sensitivity of pressure to different parameters. DOE

N92-12136# Sandia National Labs., Albuquerque, NM.
COMPACTION OF TiH(1.65)/KClO4 PYROTECHNIC POWDER DURING CONFINED BURN
S. L. Hingorani-Norenberg, A. Razani, and M. Shahinpoor (New Mexico Univ., Albuquerque.) 1990 17 p Presented at the 15th International Pyrotechnics Seminar, Boulder, CO, 9-13 Jul. 1990
(Contract DE-AC04-76DP-00789)
(DE90-013199; SAND-90-0600C; CONF-900792-8) Avail: NTIS HC/MF A03

The burning behavior of titanium subhydride potassium perchlorate (TiH(1.65)/KClO4) is currently under investigation. The research is presently aimed at studying the dynamic compaction of the material as a confined cylindrical charge of the pyrotechnic burns. Flash radiography equipment, optical fibers, and piezoelectric pressure transducers are used to study this phenomenon. The length to diameter ratio of the test charge is thirty and it is pressed in increments, which have a length to diameter ratio of one, into a cylindrical fixture consisting of an epoxy liner in a stainless steel housing. The housing has a series of radial holes to allow optical monitoring, through the transparent liner, of the ignition-front. Lead disks, placed between increments of powder, serve as x-ray tracers. Three 300 kilovolt x-ray heads are pulsed during each experiment, providing information regarding the state of compaction of the powder at three different times during the burn. Fiber optics are used to monitor the location of the ignition front. Pressure transducers monitor the pressure history inside the closed bomb. Tests have been performed with the powder at different initial densities and the data indicate that a significant amount of compaction occurs as the charge burns. DOE

N92-12137# Sandia National Labs., Albuquerque, NM.
SHOCK CHARACTERIZATION OF NITROCELLULOSE-BASED GUN PROPELLANT
L. J. Weirick 1991 9 p Presented at the 5th International Gun Propellant and Propulsion Symposium, Dover, NJ, 19-21 Nov. 1991
(Contract DE-AC04-76DP-00789)
(DE91-019057; SAND-91-1992C; CONF-911198-1) Avail: NTIS HC/MF A02

A series of shock-loading experiments on a nitrocellulose-based (NC-based) gun propellant was conducted using a light-gas gun. The intent of this work was to characterize the shock sensitivity of the gun propellant. The initial objectives were to obtaine Hugoniot data and to investigate the pressure threshold at which a reaction initiates. For the Hugoniot/reaction threshold experiments, 1/4-length grains of propellant were mounted on the front of projectiles and were impacted onto either polymethylmethacrylate (PMMA), fused silica or sapphire targets at velocities as high as 1.4 mm/microsecond, the upper limit of the gun. The particle velocity data obtained from the VISAR (Velocity Interferometer System for Any Reflector) records for the propellant fit a Hugoniot curve found in the Russian literature for a double-base, NC-nitroglycerine propellant. The density initial bulk sound velocity, and empirical parameter S values for the gun propellant were 1.63 g/cm(exp 3), 1.70 mm/microsecond and 1.85, respectively. VISAR data were also used to obtained the ignition threshold pressures of the gun propellant. Reactions were observed at impact pressures of 2.6 GPa and above. DOE

N92-12138# Pittsburgh Univ., PA. Dept. of Chemical and Petroleum Engineering.
PROBE MOLECULE STUDIES: ACTIVE SPECIES IN ALCOHOL SYNTHESIS
D. G. Blackmond and I. Wender Jul. 1991 7 p
(Contract DE-FG22-90PC-90305)
(DE92-000332; DOE/PC-90305/T3) Avail: NTIS HC/MF A02

The goal of this research is to develop a better understanding of the mechanisms of formation of alcohols and other oxygenates from syngas over supported catalysts. Different probe molecules are planned to add in situ during the reaction to help delineate reaction path ways and identify reaction intermediate species. The key of our study is to investigate how the species generated by these probe molecules interact with surface species present during oxygenate formation. CO hydrogenation reactions are being carried out in both the presence and the absence of the probe molecule under conditions which favor the formation of oxygenated products. A reaction and analysis system capable of carrying out the experiments for this study has been set up, modified, and tested. First, the commercially important Cu/ZnO/Al2O3 catalyst for methanol synthesis is being studied. Other catalysts, such as Pd and Rh with and without alkali or oxide promoters which are known to produce oxygenates from syngas, are being prepared and characterized for this study. Based on the observation of a previous study that nitromethane is an effective source of CH2 groups, it will be one of the primary probe molecules to be studied. In addition, acetylenic compounds are primary choices for this study also. These compounds were found by other workers to be effective as a source of chain initiators. DOE

29 MATERIALS PROCESSING

Includes space-based development of products and processes for commercial applications.
For biological materials see *55 Space Biology.*

N92-12139*# Alabama Univ., Huntsville. Materials Processing Lab.
MATERIALS PROCESSING IN LOW GRAVITY Final Report, 26 Oct. 1988 - 25 Oct. 1989
Gary L. Workman 26 Feb. 1990 24 p
(Contract NAS8-36955)
(NASA-CR-184213; NAS 1.26:184213) Avail: NTIS HC/MF A03 CSCL 22A

Activities of the Materials Processing in Low Gravity Program in which the University of Alabama in Huntsville (UAH) designed, fabricated, and performed various low gravity experiments in materials processing between October 26, 1988 through October 25, 1989 are discussed. Details of low gravity experiments using the Drop Facilities at the Marshall Space Flight Center (MSFC) and the KC-135 aircraft at Ellington Field are discussed. This effort included the defining of experimental requirements and equipment, experiment-facility integration requirements, building/assembling the necessary experiment apparatus, and conducting experiments which will contribute to the knowledge base for commercialization of materials processing in low gravity. UAH also performed logistical support needed to execute the experimentation, the necessary sample preparation, metallography analysis, and physical properties measurements of the processed samples. Author

N92-12140 Michigan Univ., Ann Arbor.
INCIPIENT BOILING IN MICROGRAVITY Ph.D. Thesis
Jamie Steven Ervin 1991 326 p
Avail: Univ. Microfilms Order No. DA9124006

An experimental study of incipient boiling in short-term microgravity and with a/g = +/- 1 for both pool boiling and forced convection boiling was performed. Calibrated thin gold films sputtered on a smoothly polished quarts surface were used simultaneously for thermal-resistance measurements. Three test vessels were constructed for precise measurement and control of fluid temperature and pressure: a laboratory pool boiling vessel for the a/g = 1 experiments, a pool boiling vessel designed for the 131 m free-fall for the microgravity tests, and a forced convection boiling loop for low velocity experiments with a/g = +/- 1. Measurements included the heater surface temperature, the pressure near the heating surface, the bulk liquid temperature, and the mass flow rate for the tests in the forced convection boiling loop. High speed photography was used in the experiments. With high quality microgravity and the measured initial temperature of the quiescent test fluid, R113, the temperature distribution in the liquid at the moment of boiling inception resulting from an imposed step in heat flux is known with certainty that was not previously possible. The types of boiling propagation across the large flat heating surface are categorized; the conditions nesessary for their occurrence are described. Explosive boiling propagation with a striking pattern of smale scale protuberances over the entive vapor mass periphery at heat flux levels on the order of 5 W/sq cm is described. For the heater surface with a/g = -1, a step in the heater surface temperature of short duration was imposed. The resulting liquid temperature distribution at the moment of boiling inception was different from that obtained with a step in heat flux. Author

N92-12141*# Stanford Univ., CA. Center for Materials Research.
PROTEIN CRYSTAL GROWTH IN LOW GRAVITY Annual Technical Report, 6 Jun. 1990 - 5 Jun. 1991
Robert S. Feigelson Oct. 1991 39 p
(Grant NAG8-774)
(NASA-CR-188974; NAS 1.26:188974; SU-CMR-91-4) Avail: NTIS HC/MF A03 CSCL 22A

The objective of this research is to study the effect of low gravity on the growth of protein crystals and those parameters which will affect growth and crystal quality. The application of graphoepitaxy (artificial epitaxy) to proteins is detailed. The development of a method for the control of nucleation is discussed. The factor affecting the morphology of isocitrate lyase crystals is presented. Author

N92-12142# National Research Council of Canada, Ottawa (Ontario). Inst. for Aerospace Research.
FLIGHT RESEARCH LABORATORY T-33 MICROGRAVITY FACILITY FLIGHT OPERATIONS, 1986 TO 1990
J. F. Aitken Dec. 1990 33 p
(NRC-32136; IAR-66; CTN-91-60257) Copyright Avail: NTIS HC/MF A03

The Flight Research Laboratory of the National Research Council (NRC) has been flying microgravity experiments in a T-33 aircraft in support of the NRC Space Division User Development Program since July 1988. The T-33 is a small two seat single engine military jet trainer aircraft with an average operating weight of about 15,000 pounds. It is a robust 7 G aircraft, fully aerobatic and reasonably fast with a limiting speed of 0.8 Mach No. In the two years of operation of the NRC T-33 Microgravity Facility, experiments involving medical equipment, ceramics, bubbles in a liquid, glass, protein droplets, tadpoles, goldfish, and plastic foam, using both automated and manually operated equipment, have been flown. A description of the individual experiments flown is included. Although no major modifications have been made to the aircraft systems, to accommodate zero G flight, only minor nuisance problems have occurred. Acceleration performance varies from one parabola to the next; however, a typical parabola will show longitudinal and lateral acceleration variations in the +/-0.02 G range throughout the 25 second duration and vertical acceleration variations from +/-0.04 to 0.08 G for the first and last 5 second periods and from +/-0.02 to 0.03 G for the 15 second mid-portion. In general, microgravity experiments have been well built; however, minor corrections and modifications have been required for most before installation in the aircraft. Average acceptance and installation time requires 5 days for an automated experiment and 2 days for a manually operated one. CISTI

31 ENGINEERING (GENERAL)

Includes vacuum technology; control engineering; display engineering; cryogenics; and fire prevention.

N92-12143# Sandia National Labs., Albuquerque, NM.
OPERATIONS MANUAL FOR READING VAK-3 ULTRASONIC SEALS USING A DATA ACQUISITION BOX
J. E. Walker May 1990 30 p
(Contract DE-AC04-76DP-00789)
(DE90-013644; SAND-89-3103) Avail: NTIS HC/MF A03

As part of a Department of Energy/Commission of European Communities (DOE/CEC) cooperative program, Sandia National Laboratories was asked to develop a portable ultrasonic seal pattern reading system. The system consists of a data acquisition box (DAB), a mechanical reading head, and a portable IBM-compatible PC linked to the DAB by a serial RS-232C communication link. This manual focuses on the DAB subsystem. DOE

N92-12144*# Fairchild Space Co., Germantown, MD.
CENTAUR IN-TANK EXPLOSION FLOW FIELDS WITHIN STS AND TITAN 4 PAYLOAD SPACES Interim Report
M. Eck and M. Mukunda Dec. 1988 69 p
(Contract JPL-957525)
(NASA-CR-189039; NAS 1.26:189039; FSC-ESD-217-88-435)
Avail: NTIS HC/MF A04 CSCL 13B

Explosions are examined which result from the mixing of liquid hydrogen and liquid oxygen (LH2-LO2) such that the reactants are confined by the missile (CBM) body. Explosion which were confined by the ground surface (CBGS) were also studied, with results reported elsewhere. Initial attempts to predict the reported PYRO experimental results were unsuccessful. A new reaction energy addition hypothesis was then developed and tested. The results obtained provide reasonable agreement with the experiments both in the near and far field. Calculations were performed to predict the environment which would occur at the Galileo Radioisotope Thermoelectric Generator (RTG) location given a Centaur G' upper stage and an STS launch vehicle. It was concluded that the principle threat to the RTG in this environment would be the impact of a slug of LH2. No analyses were conducted to assess the response of the Galileo RTG to such an environment. It was shown that the flow field resulting from the failure of the Centaur G' tankage was benign. It was concluded that while the cryogen particle velocity was very high, the flow field density was extremely low. As a result, the dynamic pressure was a trivial eight psia. Author

N92-12145# Aerospatiale, Paris (France). Dept. Qualite.
DESIGN OF AN INDUSTRIAL CT SYSTEM FOR VERY LARGE COMPOSITE STRUCTURES
Pierre Barbier and Philippe Morisseau (Intercontrole, Rungis, France) 1991 6 p
(Rept-911-430-133; ETN-91-90264) Avail: NTIS HC/MF A02

A priority of the design offices of motor cases, (made of advanced composites), is their reliability. For this reason the cylindrical tanks are thoroughly examined along the production line with NDT (Nondestructive Tests) methods to guarantee that every motor case is defect free. Present NDT methods include Infrared Thermography (IT), Holographic Interferometry (HI) and Tangential Film Radiography (TFR). It is hoped that a Computed Tomography (CT) system would allow full automatic control to be achieved. Before making the final decision to order a CT scanner a series of tests were performed on some specific specimens. These tests are described and a description of the scanner is given. ESA

N92-12146# Aerospatiale, Paris (France).
ACLICO: AN AID SYSTEM FOR DESIGNING BONDED JOINTS [ACLICO: UN SYSTEME D'AIDE A LA CONCEPTION DES LIAISONS COLLEES]
Martine Laborie 1991 16 p In FRENCH; ENGLISH summary
(Rept-911-430-134; ETN-91-90265) Avail: NTIS HC/MF A03

Practical applications of artificial intelligence techniques in an industrial setting are outlined. ACLICO, an aid system for the design of bonded joints between materials, composite or otherwise, is described. The approach adopted, the architecture of the system, practical application of the system and the fallout observed are described. The computer assisted design system is best adapted to designing bonded joints between composite materials to be used in space applications. ESA

N92-12147# National Defence Research Establishment, Umea (Sweden). Dept. of NBC-Defence.
RESEARCH NEEDS FOR IMPROVEMENT OF PROTECTION AGAINST EXPLOSIVE OR TOXIC INDUSTRIAL CHEMICALS HAZARDS
Mats Koenberg Jul. 1991 38 p In SWEDISH; ENGLISH summary
(FOA-C-40286-4.5; ISSN-0347-2124; ETN-91-90283) Avail: NTIS HC/MF A03; National Defence Research Establishment, S-901 82 Umea, Sweden, HC 100 Swedish crowns

A review of problems and possible improvements in explosive or toxic industrial chemical hazards is presented. Preparation for and response to industrial accidents and dispersion models are addressed. ESA

N92-12148# Sandia National Labs., Albuquerque, NM.
DEVELOPMENT OF A NON-PROPAGATING EXPLOSIVES STORAGE CABINET
W. A. Couch and B. A. Schneider (New Mexico Univ., Albuquerque.) Aug. 1991 73 p
(Contract DE-AC04-76DP-00789)
(DE91-017923; SAND-90-1906) Avail: NTIS HC/MF A04

Sandia National Laboratories, Albuquerque (SNL) has completed the design of an Explosive Components Facility (ECF). Construction of the ECF is scheduled to begin in 1992 with completion in 1995. An integral part of the ECF will be on-site storage of explosives in six earth-covered service magazines. Each magazine will contain a non-propagating Explosives Storage Cabinet (ESC) system made up to twenty modular units. In addition to the secure storage of explosives, a primary purpose of the cabinet system is to prevent a sympathetic detonation of the explosives stored in the surrounding units as a result of an accidental detonation of up to 5.0 pounds of explosives (TNT equivalent) stored in a donor unit in the cabinet. Therefore, the maximum creditable event for each service magazine is 5.0 pounds, even though each magazine could contain up to 100 pounds of explosives stored in 5.0 pounds increments. A new material being developed at the New Mexico Engineering Research Institute (NMERI) known as SIFCON (Slurry Infiltrated Fiber CONcrete), had been shown to be highly resistant to back spall from blast loadings, and penetration by high velocity ballistic projectiles and fragments. These, and other characteristics unique to SIFCON, such as very high strength and ductility, appeared to make it an excellent candidate material for the modular units of the ESC. In 1989 SNL contracted with NMERI to develop a SIFCON modular unit for the ESC. Based upon the success of Phase 1 program, a more extensive Phase 2 program was undertaken in 1990 and has been successfully completed. This paper is a summary of the Phase 1 and Phase 2 work, which includes the design, fabrication, and explosive testing of the modular units. DOE

32 COMMUNICATIONS AND RADAR

Includes radar; land and global communications; communications theory; and optical communications.

For related information see also *04 Aircraft Communications and Navigation* and *17 Space Communications, Spacecraft Communications, Command and Tracking.* For search and rescue see *03 Air Transportation and Safety,* and *16 Space Transportation.*

N92-12149*# Lightwave Electronics Corp., Mountain View, CA.
COHERENT COMMUNICATION LINK USING DIODE-PUMPED LASERS Final Report

Thomas J. Kane and Richard W. Wallace Aug. 1989 23 p
(Contract NAS5-30487)
(NASA-CR-189248; NAS 1.26:189248) Avail: NTIS HC/MF A03 CSCL 17B

Work toward developing a diffraction limited, single frequency, modulated transmitter suitable for coherent optical communication or direct detection communication is discussed. Diode pumped, monolithic Nd:YAG nonplanar ring oscillators were used as the carrier beam. An external modulation technique which can handle high optical powers, has moderate modulation voltage, and which can reach modulation rates of 1 GHz was invented. Semiconductor laser pumped solid-state lasers which have high output power (0.5 Watt) and which oscillate at a single frequency, in a diffraction limited beam, at the wavelength of 1.06 microns were built. A technique for phase modulating the laser output by 180 degrees with a 40-volt peak to peak driving voltage is demonstrated. This technique can be adapted for amplitude modulation of 100 percent with the same voltage. This technique makes use of a resonant bulk modulator, so it does not have the power handling limitations of guided wave modulators. Author

N92-12150# Lawrence Livermore National Lab., CA.
HIGH POWER IMPEDANCE MATCHERS WITH 100-ps RISETIME
R. Booth 19 Dec. 1989 27 p
(Contract W-7405-eng-48)
(DE90-013516; UCID-21632) Avail: NTIS HC/MF A03

This paper describes several impedance matchers for use with high-power, nanosecond-width pulses. These transmission-line devices are simple and economical to construct and have proven useful in a number of applications at the Lawrence Livermore National Laboratory (LLNL). The author discusses design principles, compares the characteristics of impedance matchers and conventional pulse transformers, and presents details of several successful designs which have handled pulses up to 4000V and 150A. DOE

N92-12151*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, OH.
EVALUATION OF COMPONENTS, SUBSYSTEMS, AND NETWORKS FOR HIGH RATE, HIGH FREQUENCY SPACE COMMUNICATIONS
Robert J. Kerczewski, William D. Ivancic, and John E. Zuzek 1991 13 p Presented at the Conference on Advanced Space Exploration Initiative Technologies, Cleveland, OH, 4-6 Sep. 1991; cosponsored by AIAA, NASA, and OAI Previously announced in IAA as A91-52343
(NASA-TM-105274; E-6597; NAS 1.15:105274; AIAA-91-3423)
Avail: NTIS HC/MF A03 CSCL 17B

The development of new space communications technologies by NASA has included both commercial applications and space science requirements. NASA's Systems Integration, Test and Evaluation (SITE) Space Communication System Simulator is a hardware based laboratory simulator for evaluating space communications technologies at the component, subsystem, system, and network level, geared toward high frequency, high data rate systems. The SITE facility is well-suited for evaluation of the new technologies required for the Space Exploration Initiative (SEI) and advanced commercial systems. Described here are the technology developments and evaluation requirements for current and planned commercial and space science programs. Also examined are the capabilities of SITE, the past, present and planned future configurations of the SITE facility, and applications of SITE to evaluation of SEI technology. Author

N92-12152# Ecole Nationale Superieure des Telecommunications, Paris (France).
STUDY OF ADVANCED TECHNIQUES IN MODULATION AND CODING FOR DIGITAL BEAM FREQUENCIES WITH LARGE SPECTRAL EFFECTIVENESS Ph.D. Thesis [ETUDES DES TECHNIQUES AVANCEES EN MODULATION ET CODAGE POUR FAISCEAUX HERTZIENS NUMERIQUES A GRANDE EFFICACITE SPECTRALE]
Antoine Chouly 1990 177 p In FRENCH; ENGLISH summary
(TELECOM-Paris-90-E-020; ISSN-0751-1353; ETN-91-90122)
Copyright Avail: NTIS HC/MF A09

The application of coded modulation techniques to high capacity digital microwave radio systems is addressed. Ungerboeck's two dimensional Trellis Coded Modulation (TCM) schemes and Block Coded Modulation (BCM) techniques, which seemed simpler to implement in high capacity digital microwave radio systems, are studied. Two BCM families particularly well suited for this application, the first based on one step partitioning, and the second based on two step partitioning of the signal constellation are developed and studied. Using short block lengths in both families, specific modulation schemes that transmit 4, 6, and 8 information bits per symbol are described. In addition to the optimum implementation, a suboptimum technique which makes these BCM families much simpler to implement is developed. The issue of rationally invariant code design and how this property can be achieved for both BCM families is investigated. Multidimensional TCM schemes are investigated and a family of six dimensional codes is developed. Comparison with existing multidimensional codes showed that together with Wei's four dimensional codes, this family virtually represents the best tradeoff between complexity and performance at practical signal to noise ratios. ESA

N92-12153# Defence Research Establishment, Ottawa (Ontario). Div. of Electrical Engineering.
AN IMPROVED MODEL-CREATION PROGRAM FOR EM INTERACTION ANALYSIS
S. Kashyap, M. Dion, and A. Louie Sep. 1990 3 p Presented at the Canadian Conference on Electrical and Computer Engineering, Ottawa, Ontario, 4-6 Sep. 1990
(NRC-31764; CTN-91-60242) Avail: NTIS HC/MF A01

Several codes are available for computation of the interaction of electromagnetic waves with simple and complicated structures. These codes have been extremely useful in finding numerical solutions to many electromagnetic interaction problems. All the codes have one feature in common: they require as an input the geometry of the object under study. The geometry is supplied as a wire-grid, surface-patch, or cell model, depending on the simulation code. The creation of such geometric data is not an easy task, and the difficulty increases with the complexity of the structure. To help in this regard, DIDEC (digitize, display, edit and convert) was developed at Concordia University a few years ago. Recently the Defence Research Establishment Ottawa (DREO) has made several improvements to DIDEC. DIDEC began as a program that created wire models of a geometric structure using a digitizing tablet. Initially, it created numeric electromagnetic code input files for wire grid structures. Since then it has developed into an interactive program, DIDEC/DREO, for designing wire grid, patch, and cell models of complex structures for solving electromagnetic interaction problems. This paper describes various features of the present version of DIDEC/DREO. Examples are provided which use the system to create models of CP-140 aircraft. CISTI

N92-12154# National Research Council of Canada, Ottawa (Ontario). Div. of Electrical Engineering.
CONSTRAINT PROPAGATION THROUGH ELECTROMAGNETIC INTERACTION TOPOLOGIES
Joe LoVetri and Darin P. W. Graham (Toronto Univ., Ontario) Aug. 1990 6 p Presented at the Symposium on Antenna Technology and Applied Electromagnetics, Winnipeg, Manitoba, 15-17 Aug. 1990
(NRC-31761; CTN-91-60243) Avail: NTIS HC/MF A02

The effects of electromagnetic interactions in electrical systems are of concern because of the increasing susceptibility of system components. Heuristic methods are used by engineers to solve electromagnetic interaction problems. An approximate symbolic knowledge representation of a single emitter/path/susceptor problem has been described. In this paper the approximate single emitter/path/susceptor attributes are distributed throughout the electromagnetic topology of a complex system. A constraint based

approach for the modelling of the electromagnetic interactions in the system is then described. The approach taken here subdivides the modelling task into: (1) the definition of the related physical topology; (2) constraining topological nodes with specific electromagnetic attributes; and (3) the propagation of the electromagnetic constraints to determine the probability of failure. The scheme has been implemented in Quintus Prolog on a Sun Sparcstation. The electromagnet topology is represented in Prolog using an object-oriented knowledge representation methodology. A small database containing some attributes of electromagnetic components found on the Canadian NSA helicopter was developed. A coarse topological decomposition of the helicopter was made and the attributes for the various components were entered. This tool was very useful in providing understanding of all the complex interaction paths existing in complex systems. CISTI

N92-12155# Technische Univ., Berlin (Germany, F.R.). Fachbereich Elektrotechnik.
A SYNTHESIS PROCESS FOR THE OPTIMIZATION OF THE RADIATION PROPERTIES OF MICROSTRIP ANTENNAS Ph.D. Thesis [EIN SYNTHESEVERFAHREN SUR OPTIMIERUNG DER ABSTRAHLEIGENSCHAFTEN VON MICROSTRIPANTENNEN]
Juergen Liss 1991 137 p In GERMAN
(ETN-91-90155) Avail: NTIS HC/MF A07

A process which allows a synthesis of determined radiation conditions for optimization of the outer contour of a microstrip antenna is presented. The radiation is analytically calculable for simple antenna shapes and defined mode relations on the microstrip antenna. If the antenna shape is more complex, it is necessary to make a selection among expensive analytical methods. It is shown that most of existing analysis methods cannot be used in the synthesis, on acccount of the length of required computing time. The combintation process used, resulting from segmentation and desegmentation methods, is presented. It allows an analysis of microstrip antennas of complex form, with a low computing time cost. A complex relative permittivity is introduced for the examination of ohmic and dielectric losses. Radiation losses are examined by a fictitious external network of real resistances. ESA

N92-12156# Technische Hochschule, Darmstadt (Germany, F.R.). Fachbereich Mathematik.
OPTIMALITY CONDITIONS FOR MINIMAX TASKS: AN APPLICATION EXAMPLE FROM COMMUNICATIONS ENGINEERING Ph.D. Thesis [OPTIMALITAETSBEDINGUNGEN FUER MINIMAX-AUFGABEN: EIN ANWENDUNGSBEISPIEL AUS DER NACHRICTENTECHNIK]
Dirk Kerber 1990 69 p In GERMAN
(ETN-91-90169) Avail: NTIS HC/MF A04

The internal relation of the various concepts from the theory of games, the approximation theory, and the convex optimization are explained, using the model for message transmission system. Necessary optimality conditions are given for the approximation problem. The model of a Pulse Amplitude Modulation (PAM) system is presented. The up to now unexplained existence of optimal transmission functions in single stage system is demonstrated. In three stage systems, the concept of a saddle point does not converge automatically towards solutions of minimax tasks. It is shown, that in this case, a saddle point prediction can be demonstrated for a convex fixed game. ESA

N92-12157# Norwegian Defence Research Establishment, Kjeller.
SAR IMAGING OF VORTEX SHIP WAKES. VOLUME 3: AN OVERVIEW OF PRE-ERS-1 OBSERVATIONS AND MODELS
Aage Skoeelv and Terje Wahl 23 May 1991 60 p
(FFI-91/7007-Vol-3; ISSN-0802-2437; ETN-91-90258) Avail: NTIS HC/MF A04

The visibility of dark turbulent wakes in Synthetic Aperture Radar (SAR) imagery is focused upon. An overview of various wake observations prior to ERS-1 is given. This includes images from Seasat and airborne SAR as well as photographic observations. Different turbulent wake models and simulation, schemes are reviewed. The requirements for a complete turbulent wake model are discussed, and from results available, some conclusions are drawn with respect to possible ERS-1 applications. ESA

N92-12158 National Physical Lab., Teddington (England). Div. of Electrical Science.
A NUMERICALLY-STABLE ALGORITHM FOR CALIBRATING SINGLE SIX-PORTS FOR NATIONAL MICROWAVE REFLECTOMETRY
T. E. Hodgetts Nov. 1990 30 p
(NPL-DES-102; ISSN-0143-7305; ETN-91-90295) Copyright
Avail: National Physical Lab., Teddington, TW11 0LW, England

A full description and analysis of the numerically stable algorithm currently used for calibrating single six ports or multi states for national microwave reflectometry, employing as standards four one port devices having known voltage reflection coefficients, is given. ESA

N92-12159# Massachusetts Univ., Amherst. Microwave Remote Sensing Lab.
GROUND-BASED MILLIMETER WAVE CLOUD PROFILING RADAR SYSTEM (CPRS)
R. E. McIntosh, A. L. Pazmany, and J. B. Mead Aug. 1991 11 p
(Contract DE-FG02-90ER-61060)
(DE91-018373; DOE/ER-61060/1) Avail: NTIS HC/MF A03

The proposed Cloud Profiling Radar System (CPRS) is a two frequency (35 GHz, 95 GHz) polarimetric radar with a single reflector-lens antenna. The system will be used to perform three dimensional Doppler and polarimetric measurements on clouds. The various subsystems are currently being developed and this report gives technical details about the status of these subsystems. This report also updates other research activities. DOE

N92-12525# Mission Research Corp., Santa Barbara, CA.
AUTOMATED THREAT RESPONSE RECOMMENDATION IN ENVIRONMENTS OF HIGH DATA UNCERTAINTY USING THE COUNTERMEASURE ASSOCIATION TECHNIQUE (CMAT)
George B. Chapman, Glenn Johnson, and Robert Burdick *In* AGARD, Machine Intelligence for Aerospace Electronic Systems Sep. 1991 12 p (For primary document see N92-12517 03-63)
(Contract F33657-89-C-2175)
Copyright Avail: NTIS HC/MF A14; Non-NATO Nationals requests available only from AGARD/Scientific Publications Executive

N92-12526# Lockheed Canada, Inc., Sittsville (Ontario).
FUTURE ESM SYSTEMS AND THE POTENTIAL FOR NEURAL PROCESSING
Arthur G. Self and Gregory P. Bourassa *In* AGARD, Machine Intelligence for Aerospace Electronic Systems Sep. 1991 10 p (For primary document see N92-12517 03-63)
Copyright Avail: NTIS HC/MF A14; Non-NATO Nationals requests available only from AGARD/Scientific Publications Executive

N92-12537# Intelligent Electronics, Tel Aviv (Israel).
USING AITEST TO TROUBLESHOOT A RADAR MODULATOR (RM) UNIT: A CASE STUDY IN THE APPLICATION OF EXPERT SYSTEMS TO INTERMEDIATE-LEVEL TESTING
Moshe Ben-Bassat (Tel-Aviv Univ., Israel), Daphna Ben Arie, Israel Beniaminy, Jonathan Cheifetz, Michal Eshel, Noam Fogel, Yael Karov, Irene Menkin, Mordechai Sela, and Michal Shalev et al *In* AGARD, Machine Intelligence for Aerospace Electronic Systems Sep. 1991 8 p (For primary document see N92-12517 03-63)
Copyright Avail: NTIS HC/MF A14; Non-NATO Nationals requests available only from AGARD/Scientific Publications Executive

N92-12541# Rome Air Development Center, Griffiss AFB, NY.
C3I GRAPHICAL APPLICATIONS
Earl C. LaBatt, Jr. *In* AGARD, Machine Intelligence for Aerospace Electronic Systems Sep. 1991 11 p (For primary document see N92-12517 03-63)

Copyright Avail: NTIS HC/MF A14; Non-NATO Nationals requests available only from AGARD/Scientific Publications Executive

N92-12803*# Cornell Univ., Ithaca, NY. National Astronomy and Ionosphere Center.
ARECIBO S-BAND RADAR PROGRAM
Donald B. Campbell *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 23-25 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 17I

33 ELECTRONICS AND ELECTRICAL ENGINEERING

Includes test equipment and maintainability; components, e.g., tunnel diodes and transistors; microminiaturization; and integrated circuitry.

For related information see also *60 Computer Operations and Hardware* and *76 Solid-State Physics.*

N92-12160# Sandia National Labs., Albuquerque, NM.
THERMAL EFFECTS ON THE JOSEPHSON SERIES-ARRAY VOLTAGE STANDARD
R. V. Duncan 1990 3 p Presented at the 19th International Conference on Low Temperature Physics, Brighton, England, 16-22 Aug. 1990
(Contract DE-AC04-76DP-00789)
(DE90-008738; SAND-90-0646C; CONF-900806-1) Avail: NTIS HC/MF A01

Microfabricated series-arrays of Josephson junctions have been developed which are capable of producing quantized voltage levels over a wide voltage range. These arrays have been used in a calibration system since February 10, 1987 to maintain the U.S. Legal Volt at the National Institute of Standards and Technology (NIST, formerly NBS). A similar system within the Primary Standards Laboratory (which is operated for the Department of Energy, Albuquerque Operations Office by Sandia National Laboratories (SNL)) has been in operation since July, 1989. Measurements of the temperature dependence of the array's quantized voltage states and DC characteristics are reported here. DOE

N92-12161# Sandia National Labs., Albuquerque, NM.
CHARACTERIZATION AND DEVELOPMENT REPORT FOR THE 381558
L. Curtis 21 May 1990 54 p
(Contract DE-AC04-76DP-00789)
(DE90-010395; SAND-89-0947) Avail: NTIS HC/MF A04

This report documents the characterization and development of the 381558 (2N6193JTXV), a medium power PNP silicon transistor designed for switching and wide band amplifier applications. The 2N6193JTXV is manufactured by Motorola. DOE

N92-12162# Oak Ridge National Lab., TN.
DESIGNING EQUIPMENT FOR USE IN GAMMA RADIATION ENVIRONMENTS
K. U. Vandergriff May 1990 103 p
(Contract DE-AC05-84OR-21400)
(DE90-012050; ORNL/TM-11175) Avail: NTIS HC/MF A06

High levels of gamma radiation are known to cause degradation in a variety of materials and components. When designing systems to operate in a high radiation environment, special precautions and procedures should be followed. This report outlines steps that should be followed in designing equipment and explains the general effects of radiation on various engineering materials and components. Much information exists in the literature on radiation effects upon materials. However, very little information is available to give the designer a step-by-step process for designing systems that will be subject to high levels of gamma radiation, such as those found in a nuclear fuel reprocessing facility. In this report, many radiation effect references are relied upon to aid in the design of components and systems. DOE

N92-12163# Sandia National Labs., Albuquerque, NM.
RECOVERY OF HIGH FIELD GaAs PHOTOCONDUCTIVE SEMICONDUCTOR SWITCHES
F. J. Zutavern, G. M. Loubriel, M. W. OMalley, L. P. Schanwald, and D. L. McLaughlin 1990 7 p Presented at the 19th Power Modulator Symposium, San Diego, CA, Jun. 1990
(Contract DE-AC04-76DP-00789)
(DE90-013062; SAND-90-0061C; CONF-9006176-5) Avail: NTIS HC/MF A02

GaAs photoconductive semiconductor switches (PCSS) are useful as fast recovery switches at electric field stresses below 3.5-8 kV/cm. Following a short activating light pulse in this low field regime, the switch resistance increases roughly exponentially with time constants ranging from 0.1-1000 ns, depending on the type of GaAs. At higher fields, however, the resistive recovery depends not only on material properties, but also on the minimum resistance reached during the activating light pulse (trigger resistance), the wavelength of the light pulse, and the field remaining across the switch during recovery. In particular, if the switch is activated with a significantly intense light pulse, it will stay on and maintain the circuit-dependent impedance which is required to hold a constant, material-dependent field across the switch (lock-on). Since the circuit-dependent impedance achieved during lock-on can be several orders of magnitude less than the resistance required for triggering, a substantial savings can be made in the optical energy required to activate the switch. The lock-on switching mode shows gain relative to linear (low-field) PCSS. Fast recovery of GaAs switches after high field switching is of particular interest for high repetition rate applications where it is difficult to provide the large optical trigger energy required for switches operating at low fields. We have explored three categories of circuits to induce fast recovery after lock-on by temporarily reducing the field across the switch. Measurements of recovery times from 35-80 ns, multiple monopolar and bipolar bursts at 5-40 MHz, and hold -off fields ranging from 5-44 kV/cm (corresponding to 15-66 kV across individual switches), will b e presented. A comparison will be made of the different circuits used to induce recovery from lock-on and the various factors that influence the recovery will be discussed. DOE

N92-12164# Sandia National Labs., Albuquerque, NM.
THE REPETITIVE HIGH ENERGY PULSED POWER MODULE
H. C. Harjes, K. W. Reed, M. T. Buttram, B. N. Turman, E. L. Neau, L. Martinez, J. Adcock, E. A. Weinbrecht, G. A. Mann, and F. A. Morgan et al 1990 6 p Presented at the 19th Power Modulator Symposium, San Diego, CA, Jun. 1990
(Contract DE-AC04-76DP-00789)
(DE90-013076; SAND-90-0419C; CONF-9006176-7) Avail: NTIS HC/MF A02

High average power magnetic pulse compression systems are being considered for use in several applications. One of the key issues in the design of a pulsed power driver for these applications is component reliability, efficiency, and lifetime. In the Repetitive High Energy Pulsed Power (RHEPP) module, pulse compression is done exclusively with magnetic switches (saturable reactors) because such switches have the potential of performing efficiently and reliably for greater than 10(exp 10) shots. The objective of the RHEPP project is to explore the feasibility of using magnetic pulse compression technology in continuous high average power applications. The RHEPP system consists of a compressor which drives a linear induction voltage adder with a diode load. Prime power for the module is supplied by a 600 kW, 120 Hz, alternator (furnished by Westinghouse Electric Corporation). At present, construction and initial testing in a bipolar mode of the first two stages of the compressor has been completed. This system has operated for a total of 332 minutes (4.8 x 10(exp 6) pulses) at full power (600 kW) with an efficiency of 94 minus plus 3 percent. The first stage magnetic switch (MS1) has a pulse compression factor of 8.4 (4.2 ms to 500 micro-s time to peak). It has two, parallel connected, 67 turn copper coils and a 760 kg core of 2 mil silicon steel with a magnetic cross sectional area of 0. 065 sq m. The second stage magnetic switch (MS2) has a pulse compression factor of 3 (500 to 170 micro-s). It has two,

parallel connected, 36 turn copper coils and a 361 kg core of field annealed 2605CO Metglas with a magnetic area of 0.019 sq m. A discussion of RHEPP compressor design effort and its baseline design is given. In addition, initial results from the operation of the first two stages are presented. DOE

N92-12165# Sandia National Labs., Albuquerque, NM.
CHANNEL COOLING-TECHNIQUES FOR REPETITIVELY PULSED MAGNETIC SWITCHES
K. W. Reed, G. J. Weber, R. W. Wavrik, H. C. Harjes, M. T. Buttram, E. L. Neau, L. Martinez, J. Adcock, G. E. Laderach, and M. Butler et al 1990 40 p Presented at the 19th Power Modulator Symposium, San Diego, CA, Jun. 1990
(Contract DE-AC04-76DP-00789)
(DE90-013077; SAND-90-0201C; CONF-9006176-8) Avail: NTIS HC/MF A03

Design data on cooling channel fabrication techniques, size, and geometries tailored to magnetic switches, is presented. Free and forced convection channel structures suitable for magnetic switches are proposed and experimentally characterized. Magnetic core temperature data from earlier experiments, using an electrically heated core, are formulated into design graphs relating maximum allowable build between cooling channels to maximum core temperature and thermal generation rate. The resultant design curves are applicable to both magnetic cores and electrical windings. Practical limits on inter-channel build and thermal generation for free convection are established. Effects of forced convection on the cooling capacity of a channel are discussed. Design curves are applied to a full-scale magnetic switch design. Measured temperatures in two full-scale switches are compared to model predictions. Thermal measurements from full scale prototypes of the first two RHEPP magnetic switches, operating at 600 KW and 120 pulses/second are compared to predictions from both a simple, one-dimensional model and a more sophisticated simulation. These measurements are limited to transients, since the switches were built primarily to investigate basic switching issues at full power in repetitively pulsed operation and were therefore not equipped initially with adequate cooling for continuous operation. The thermal effects due to the non-uniform current distribution in the flat winding of an actual pulsed switch are observed and discussed. Issues that need to be addressed are posed. DOE

N92-12166# Los Alamos National Lab., NM.
CALCULATED NON-LINEAR MAGNETIC FIELD PENETRATION OF PLASMA OPENING SWITCHES
R. J. Mason, M. E. Jones, D. C. Wilson, C. Bergman, K. Thiem, J. M. Grossmann, and P. F. Ottinger (Naval Research Lab., Washington, DC.) 15 Jun. 1990 7 p Presented at the 8th International Conference on High-Power Particle Beams, Novosibirsk (USSR), 2-5 Jul. 1990
(Contract W-7405-eng-36)
(DE90-013156; LA-UR-90-2135; CONF-9007111-6) Avail: NTIS HC/MF A02

We examine magnetic field penetration in the Plasma Opening Switch, exploring, in particular, advective field penetration arising in conjunction with radial density gradients across the cathode anode gap. Our calculations have been completed with the implicit multi-fluid, ANTHEM code. We show favored penetration along a radial density jump, unstable plain wave penetration for a 1/(y - y(sub alpha+epsilon)) density dependence (with y measured from cathode to anode at y(sub alpha)) in planar switches, and the penetration of finger-like magnetic field perturbations, when the fill plasmas bears initial sinusoidal disturbances on its generator interface. DOE

N92-12167# Sandia National Labs., Albuquerque, NM.
A REPETITIVE, ONE MICROSECOND, THIRTY-FIVE KILOJOULE, TWO HUNDRED KILOVOLT PULSE GENERATOR
L. F. Rinehart, R. S. Clark, M. T. Buttram, J. E. Mikkalson, and P. E. Patterson 1990 6 p Presented at the 19th Power Modulator Symposium, San Diego, CA, Jun. 1990
(Contract DE-AC04-76DP-00789)
(DE90-013063; SAND-89-3137C; CONF-9006176-6) Avail: NTIS HC/MF A02

The objective of this work has been to produce a compact, light-weight, high-energy modulator. The device was to power various low-impedance loads including up to 25 vacuum diodes in parallel. Desired characteristics were a 1-microsecond rectangular pulse of 200-kV amplitude into 1- to 2.5-ohm loads. Pulse repetition rates from single shot to 10 pulses per second (PPS) were required. A modular design was employed in which two 17.5 kJ, type C Pulse Forming Networks (PFNs) were stacked and their outputs added in series to meet the pulse requirements. The design and construction of each module and the interconnecting circuitry is presented. Problem areas in the pulser development included: low inductance design; spark gap switch stability, efficiency, and simultaneity; and fast (100 ms) charging of the high-energy PFN for 10-PPS operation. Each of these issues is addressed in this paper. DOE

N92-12168# Oak Ridge National Lab., TN.
DIELECTRIC-LIQUID PULSED POWER SWITCH
L. G. Christophorou and H. Faidas 1990 6 p Presented at the 10th International Conference on Conduction and Breakdown in Dielectric Liquids, Grenoble, France, 10-14 Sep. 1990
(Contract DE-AC05-84OR-21400)
(DE90-009425; CONF-9009125-2) Avail: NTIS HC/MF A02

Room temperature fast dielectric liquids with electron conduction bands (V(sub 0) less than O eV; e.g., neopentane, tetramethylsilane, 2,2,4,4- tetramethyl pentane and their mixtures) are electrically-active insulators and have potential as controlled conduction media in pulsed power switching devices. A concept for a dielectric-liquid pulsed power switch employing flash lamps is outlined. DOE

N92-12169# Los Alamos National Lab., NM.
INTERNAL DYNAMICS OF ELECTRICAL DISCHARGES
A. Kadish, W. B. Maier, II, and R. T. Robiscoe (Montana State Univ., Bozeman.) 1990 20 p Presented at the Discharges and Electrical Insulation in Vacuum, Sante Fe, NM, 17-20 Sep. 1990
(Contract W-7405-eng-48)
(DE90-013161; LA-UR-90-2092; CONF-9009192-1) Avail: NTIS HC/MF A03

The existence of thresholds for electrical discharge onset suggests a functional relation between macroscopic resistivity and current. At low current, the resistivity should be inversely proportional to the magnitude of the current. Macroscopic models which employ this scaling predict many empirically observed properties of transient electrical discharges, such as: (1) thresholds for onset of current; (2) abrupt termination of current in active regions of a current channel; (3) current restart in passive regions of current channels; (4) leaders; and (5) residual charge, both in channels and at sources when current terminates. We present an overview of research with these models and use examples to illustrate the results that have been obtained. We also show how these models predict current channel formation and describe results of efforts to benchmark theory with experimental data. DOE

N92-12170# Sandia National Labs., Albuquerque, NM.
THERMAL BATTERY STATISTICS AND PLOTTING PROGRAMS
G. L. Scharrer Apr. 1990 51 p
(Contract DE-AC04-76DP-00789)
(DE90-013873; SAND-89-1748) Avail: NTIS HC/MF A04

Thermal battery functional test data are stored in an HP3000 minicomputer operated by the Power Sources Department. A program was written to read data from a battery data base, compute simple statistics (mean, minimum, maximum, standard deviation, and K-factor), print out the results, and store the data in a file for subsequent plotting. A separate program was written to plot the data. The programs were written in the Pascal programming language. DOE

N92-12171# Argonne National Lab., IL.
PERFORMANCE EVALUATION OF ADVANCED BATTERY TECHNOLOGIES FOR ELECTRIC VEHICLE APPLICATIONS
W. H. DeLuca, A. F. Tummillo, J. E. Kulaga, C. E. Webster, K. R. Gillie, and R. L. Hogrefe 1990 6 p Presented at the 25th Intersociety Energy Conversion Engineering Conference, Reno, NV, 12-17 Aug. 1990
(Contract W-31-109-eng-38)
(DE90-013895; CONF-900801-21) Avail: NTIS HC/MF A02

At the Argonne Analysis and Diagnostic Laboratory, advanced battery technology evaluations are performed under simulated electric vehicle operating conditions. During 1989 and the first quarter of 1990, single cell and multicell modules from seven developers were examined for the Department of Energy and Electric Power Research Institute. The results provide battery users, developers, and program managers with an interim measure of the progress being made in battery R&D programs, a comparison of battery technologies, and a source of basic data for modeling and continuing R&D. This paper summarizes the performance and life characterizations of two single cells and seven 3- to 960-cell modules that encompass six technologies (Na/S, Ni/Fe, Ni/Cd, Ni-metal hydride, lead-acid, and Zn/Br). DOE

N92-12172# Lawrence Livermore National Lab., CA.
CATHODE APPLICATIONS TO HIGH-CURRENT DIODES
P. A. Pincosy, P. Poulsen, and D. Greenwood 31 May 1990 5 p Presented at the 5th National Conference on High-Power Microwave Technology, West Point, NY, 10-15 Jun. 1990
(Contract W-7405-eng-48)
(DE90-013290; UCRL-102516; CONF-9006179-4) Avail: NTIS HC/MF A01

A principal limitation of pulse length for high electron current density diodes is the gap closure due to plasma propagation. This closure is due to plasma formed on the cathode and anode in the process of explosive field emission created by the required high field stresses of the high current diode. Experimental results of high current density T-F cathode and a plasma cathode will be presented. Current densities of greater than 300 A/sq cm were obtained for pulse lengths of 3 microsec. Typical closure velocities were less than 2 mm/usec compared with the typical 2 cm/microsec for explosive emission cathodes. DOE

N92-12173*# National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.
AN ANALYTICAL AND EXPERIMENTAL STUDY TO INVESTIGATE FLUTTER SUPPRESSION VIA PIEZOELECTRIC ACTUATION M.S. Thesis - George Washington Univ., 1991
Jennifer Heeg [1991] 123 p
(NASA-TM-893240; NAS 1.15:893240) Avail: NTIS HC/MF A06 CSCL 09C

The objective was to analytically and experimentally study the capabilities of adaptive material plate actuators for suppressing flutter. The validity of analytical modeling techniques for piezoelectric materials was also investigated. Piezoelectrics are materials which are characterized by their ability to produce voltage when subjected to a mechanical strain. The converse piezoelectric effect can be utilized to actuate a structure by applying a voltage. For this investigation, a two degree of freedom wind tunnel model was designed, analyzed, and tested. The model consisted of a rigid airfoil and a flexible mount system which permitted a translational and a rotational degree of freedom. It was designed such that flutter was encounted within the testing envelope of the wind tunnel. Actuators, made of piezoelectric material were affixed to leaf springs of the mount system. Each degree of freedom was controlled by a separate leaf spring. Command signals, applied to the piezoelectric actuators, exerted control over the damping and stiffness properties. A mathematical aeroservoelastic model was constructed using finite element methods, laminated plate theory, and aeroelastic analysis tools. Plant characteristics were determined from this model and verified by open loop experimental tests. A flutter suppression control law was designed and implemented on a digital control computer. Closed loop flutter testing was conducted. The experimental results represent the first time that adaptive materials have been used to actively suppress flutter. It demonstrates that small, carefully placed actuating plates can be used effectively to control aeroelastic response. Author

N92-12174*# National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.
VACUUM-ISOLATION VESSEL AND METHOD FOR MEASUREMENT OF THERMAL NOISE IN MICROPHONES Patent Application
Allan J. Zuckerwar, inventor (to NASA) and Kim Chi T. Ngo, inventor (to NASA) (Old Dominion Univ., Norfolk, VA.) 7 Oct. 1991 17 p
(NASA-CASE-LAR-14567-1-CU; NAS 1.71:LAR-14567-1-CU; US-Patent-Appl-SN-773376) Avail: NTIS HC/MF A03 CSCL 09C

The vacuum isolation vessel and method in accordance with the present invention are used to accurately measure thermal noise in microphones. The apparatus and method could be used in a microphone calibration facility or any facility used for testing microphones. Thermal noise is measured to determine the minimum detectable sound pressure by the microphone. Conventional isolation apparatus and methods have been unable to provide an acoustically quiet and substantially vibration free environment for accurately measuring thermal noise. In the present invention, an isolation vessel assembly comprises a vacuum sealed outer vessel, a vacuum sealed inner vessel, and an interior suspension assembly coupled between the outer and inner vessels for suspending the inner vessel within the outer vessel. A noise measurement system records thermal noise data from the isolation vessel assembly. A vacuum system creates a vacuum between an internal surface of the outer vessel and an external surface of the inner vessel. The present invention thus provides an acoustically quiet envirornment due to the vacuum created between the inner and outer vessels and a substantially vibration free environment due to the suspension assembly suspending the inner vessel within the outer vessel. The thermal noise in the microphone, effectively isolated according to the invention, can be accurately measured. NASA

N92-12175# Technische Univ., Eindhoven (Netherlands).
IC DEFECT-SENSITIVITY: THEORY AND COMPUTATIONAL MODELS FOR YIELD PREDICTION Ph.D. Thesis
Jose de Jesus PinedadeGyvez 5 Aug. 1991 129 p
(UDC-621.382.049.77:681.306(043; ISBN-90-9003969-4; ETN-91-90128) Copyright Avail: NTIS HC/MF A07

Spot defects caused in the manufacturing processes of Integrated Circuits (ICs) and their effect in the layout geometry as regards yield losses are investigated. A formal semantic model for process induced spot defects is presented to show the relationship among defects, technological process and circuit malfunction. A mathematical analysis of the geometrical properties of critical area and a taxonomy of defect sensitive models based on the prescence of single or multiple faults, induced by single or multiple defects placed on single or multiple layers are presented. A practical method to correctly find critical areas in single layers is presented and extended to consider multiple layers. The multiple layer approach is shown to provide the means for a more accurate yield prediction by a comparison of the single and multiple methods on a basis of several case study designs. ESA

N92-12176# Technische Univ., Eindhoven (Netherlands).
COMPACT MODELING OF THE DYNAMIC BEHAVIOUR OF MOSFETs Ph.D. Thesis
Taede Smedes 1991 178 p Sponsored by Dutch Innovative Research Program
(ISBN-90-9004212-1; ETN-91-90129) Avail: NTIS HC/MF A09

Various ways of modeling semiconductor devices are discussed and a review of the analytical DC modeling of MOSFETs is presented. A short channel DC model used is discussed. The modeling of the dynamic behavior of the ideal part of the transistor using the quasi static approximation is discussed and a method to partition the channel charge in a source and drain charge, necessary for application in circuit simulation, is presented.

Expressions for the charges are derived and resulting explicit expressions for the capacitances are presented. A practical compact charge and capacitance model for MOSFETs is discussed taking into account effects such as velocity saturation, the bulk effect and channel length modulation. The model is extended by taking into account parasitic elements inherent to the actual transistor. A high frequency applications model is derived. The models are compared with measurement results for several transistors with different gate lengths. ESA

N92-12177# National Research Council of Canada, Ottawa (Ontario). Div. of Electrical Engineering.
BULLETIN OF THE DIVISION OF ELECTRICAL ENGINEERING, 1987-1988, VOLUME 3, NUMBER 2
May 1988 215 p In ENGLISH and FRENCH
(NRC-29078-Vol-3-No-2; ISSN-0706-568X; CTN-91-60306) Avail: NTIS HC/MF A10

A report is provided on the activities of the Division of Electrical Engineering of the National Research Council of Canada. The Division engages in the development of standards and test procedures, and undertakes applied research in support of Canadian industry, government departments, and universities. Technology transfer and collaborative research continue to grow in importance as focuses of Division activities. The Division is comprised of three sections: the Laboratory for Biomedical Engineering, the Laboratory for Electromagnetic and Power Engineering, and the Laboratory for Intelligent Systems. An agreement has been reached to commercially exploit the realtime multiprocessor operating system Harmony. The dielectrics group has made contract research agreements with industry from both Canada and the United States. The possibility of employing a new advanced laser vision camera, which can be mounted on a robot arm in a variety of industrial applications is being explored. Potential short-term spinoffs related to intelligent wheelchairs are being sought as part of the new interlaboratory program which has as its long-term objective the development of a mobile robot for health care applications. A program in applied artificial intelligence has been established. Initiatives in collaboration with outside groups include proposals for major institutes in areas ranging from police and security research to rehabilitation research, programs to enhance Canadian industrial competence working with the Canadian Manufacturers' Association and other government departments, and approaches to the utilization of existing facilities which will make them more valuable without significant financial expenditures. CISTI

N92-12178# Nationaal Inst. voor Kernfysica en Hoge Energiefysica, Amsterdam (Netherlands).
A LINEAR VARIABLE DIFFERENTIAL TRANSFER (LVDT) CONDITIONER FOR THE BUNDLE PROFILE MONITOR OF AmPS [EEN LVDT CONDITIONER VOOR DE BUNDELPROFIELMONITOREN VAN AMPS]
J. T. vanEs and J. H. vanTrigt 1991 19 p In DUTCH
(DIGEL-1991-1; ETN-91-90047) Avail: NTIS HC/MF A03

Commercially available integrated circuits for linear variable differential transfer (LVDT) which could be applied to bundle profile monitors of the Amsterdam Pulse Stretcher (AmPS) were examined. The principles of a LVDT are explained. It is a tranducer to sense displacements, suited for radioactive environments. The signal conditioner is required to get information about the iron core into the transducer. The temperature behavior and the calibration of the conditioners are discussed. ESA

N92-12179# Laboratoire d'Automatique et d'Analyse des Systemes, Toulouse (France). Groupe Circuits et Composants a Effets de Champ.
V.DMOS TRANSISTOR MODELING FOR SIMULATION OF POWER ELECTRONIC CIRCUITS Ph.D. Thesis - Inst. National des Sciences Appliquees
Malgorzata Napieralska 1991 206 p In FRENCH; ENGLISH summary
(LAAS-91711; ETN-91-90127) Avail: NTIS HC/MF A10

A nonlinear, short channel model of a power V.DMOS transistor, the elements of which depend only on physical and technological data, is presented. By an analysis of the active regions of the V.DMOS structure, in order to study switching modes, this model is simplified to a topology compatible with the SPICE circuit simulator. Parameter extraction methods and validation programs are described. A software library of the SPICE models is created by testing the transistors (N and P channels) covering the available current handling capability 2A to 50A and blocking range 50V to 1000V. A V.DMOS unified model is presented. It requires establishment of two parameters: drain source breakdown voltage, and silicon chip area. An established program linked in Hypercard with SPICE, gives an exact model for characterizing transistors as well as a model for new devices. This modeling takes into account the crystal temperature and several validation tests. Adaptation of the model for irradiation applications is pointed out by comparison between measured and computed characteristics. Use of this model to analyze bridge leg circuit properties and comparison between simulated results and measured data, confirms its application in power electronic circuits. Some problems associated with parasitic elements in these circuits are described. ESA

N92-12180# Technische Univ., Berlin (Germany, F.R.). Fachbereich Elektrotechnik.
STARTING CURRENTS IN COILS WITH CONDUCTIVE PERMEABLE CORE, ALLOWING FOR INDUCED EDDY CURRENTS Ph.D. Thesis [EINSCHALSTROEME IN SPULEN MIT LEITENDEM PERMEABLEN KERN BEI BERUECKSICHTIGUNG DER INDUZIERTEN WIRBELSTROEME]
Arnim Nethe 1991 129 p In GERMAN
(ETN-91-90158) Avail: NTIS HC/MF A07

The transition from a voltage surge to a periodical square wave voltage was carried out in order to simplify the calculation. By a periodical square wave voltage, an excitation was produced whose Fourier development led to the sum of single sinusoidal alternating voltages of various frequencies. The adjusted current was determined for each alternating voltage in order to obtain the starting current by interference of the single component currents. For a fixed frequency, it led to a problem of stationary skin effect. When the differential equations were solved, a complete equations system could be set up. From the given current and induced tension, a frequency dependent impedance was defined. From Fourier expansion of voltage and impedance, the starting current could be represented as a Fourier series. ESA

N92-12181# Technische Univ., Berlin (Germany, F.R.). Fachbereich Elektrotechnik.
EXAMINATION OF SAMPLING CONTROL SYSTEMS FOR INVERTERS OF LIMITED PULSE REPETITION Ph.D. Thesis [UNTERSUCHUNG VON ABTASTREGELVERFAHREN FUER WECHSELRICHTER BESCHRAENKTER PULSFREQUENZ]
Thomas Schuetze 1990 162 p In GERMAN
(ETN-91-90159) Avail: NTIS HC/MF A08

The return circuit, simulation and testing of inverter control processes are reported. They are adapted to the requirements and dynamic possibilities of low sampling frequencies. The applicability of the process is examined, with regard to the operation at high inverter output of over 100 kVA and to the possible working frequencies of inverter values, from 1 to 2 kHz. Feedback processes with free pulse patterns are considered. The tolerance band control process and the dead beat control system are compared. It is shown that regulation with a dead beat process combined with a new developed pulse positioning process, can give very good results. ESA

N92-12182# Technische Univ., Berlin (Germany, F.R.). Fachbereich Elektrotechnik.
OPTIMAL REALIZATION OF MULTISTAGE CASCADE CIRCUITS Ph.D. Thesis [OPTIMALE REALISIERUNG VON MEHRSTUFIGEN CASCODE-SCHALTREISEN]
Klaus Hoffmann 1990 73 p In GERMAN
(ETN-91-90165) Avail: NTIS HC/MF A04

A new process is presented for the optimal realization of logic

functions by multiplexer implemented with cascade circuits. Several physical or electrical effectiveness criteria are taken into consideration: the current consumption, which often limits the integration scale with such circuits; and the number of transistors, as a dimension for floor space required. Algorithms developed for the logic design are algorithms which constitute truth tables for the representation of the function, algorithms for issue of combinatorial circuits such as printed circuits, and algorithms, which by using binary decision diagrams obtain efficient test patterns for any defect. ESA

N92-12183# Technische Univ., Berlin (Germany, F.R.). Fachbereich Elektrotechnik.
A CONTRIBUTION TO THE IDENTIFICATION OF INTERNAL FAULTS IN ELECTRICAL MACHINES Ph.D. Thesis [EIN BEITRAG ZUR ERKENNUNG INNERER FEHLER IN ELEKTRISCHEN MASCHINEN]
Weijung Shi 1990 172 p In GERMAN; ENGLISH summary
(ETN-91-90167) Avail: NTIS HC/MF A08

A new concept is introduced to identify internal winding faults solely by the measurement of terminal voltages and currents. A suitable combination of characteristic features is found, which is compared with a database. The apriori knowledge of the data base is gathered from many simulations of internal winding faults. A regression algorithm for a fast Fourier series expansion is presented to extract on line characteristic features of the frequency domain. Results showed that the new design introduced improves the reliability and the speed of traditional protection techniques using suitable characteristic feature combinations. The information concerning internal faults can be displayed on line. ESA

N92-12184# Technische Hochschule, Darmstadt (Germany, F.R.). Fachbereich Physik.
THE STABILITY OF GRAPHITE BRUSHES AT HIGH VELOCITY Ph.D. Thesis [ZUR STABILTAET VON KOHLEBUERSTEN BEI HOHER GESCHWINDIGKEIT]
Arwed R. Uecker 1990 82 p In GERMAN
(ETN-91-90176) Avail: NTIS HC/MF A05

The unequal current distribution between parallel switched graphite brushes on high velocity slip rings, is examined. It is shown that the formation of a particular contact film on the graphite brush surface is possible. The properties and physicochemical texture on the contact film can be determined, and the influence on current distribution can be demonstrated. Using Raman spectroscopy and electron diffraction, it is shown that the contact film is composed of very tiny and mean crystallite bulk. An analytical examination of the dynamics of graphite brushes shows that, under determined conditions, an aerodynamical oiling wedge is formed, which leads to contact guidance. Theoretical calculation demonstrates experimental results. ESA

N92-12185*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, MD.
NUMERICAL AND EXPERIMENTAL STUDY OF CURVED AND PLANAR FREQUENCY SELECTIVE SURFACES WITH ARBITRARY ILLUMINATION M.S. Thesis - Maryland Univ., 1989
Armen Caroglanian Washington Apr. 1991 97 p
(NASA-TM-104540; Rept-91E01722; NAS 1.15:104540) Avail: NTIS HC/MF A05 CSCL 09C

A frequency selective surface (FSS) composed of apertures in a metallic sheet is known as the inductive FSS. The infinite inductive FSS theory is derived and the aperture fields are solved by a spectral domain formulation with method of moments solution. Both full domain and subsectional basis functions are studied. A locally planar technique (LPT) is used to determine the forward scattered field from a generally shaped inductive FSS with arbitrary illumination. Author

N92-12186# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Computer Science.
THE ENERGY COMPLEXITY OF THRESHOLD AND OTHER FUNCTIONS (PRELIMINARY VERSION)
Gloria Kissin and John Tromp (Amsterdam Univ., Netherlands) Jan. 1991 15 p Sponsored by Netherlands Organization for the Advancement of Research
(CWI-CS-R9101; ETN-91-90218) Copyright Avail: NTIS HC/MF A03

A novel construction is described that yields fast, minimum energy Very Large Scale Integration (VLSI) Circuits that compute threshold and counting functions. The results are obtained in the uniswitch model of switching energy. ESA

N92-12187 Politecnico di Milano (Italy). Dipt. di Elettronica.
THE STATE VARIABLE METHOD AS A UNIFYING APPROACH TO THE STUDY OF SEMICONDUCTOR DEVICES
A. Castoldi, E. Gatti, A. Longoni, and M. Sampietro 1990 35 p Submitted for publication
(Rept-90-045; ETN-91-90243) Avail: Politecnico di Milano, Piazza Leonardo da Vinci 32, 20133 Milan, Italy

The application of the state variable method to the solution of the one dimensional Poisson equation at thermal equilibrium in semiconductor devices is presented. The method is based on the determination of the analytical relationship between the state variables potential (p) and electric field (e), and on its representation, as a trajectory, in the plane. The trajectories of semiconductors, metal contacts and oxide layers are calculated. A device formed of any combination of these materials can be represented and studied in the p/e plane. The graphical representation of these trajectories is addressed and it is shown how analysis allows, in a simple and didactic way, a thorough comprehension of the typical characteristics of multijunction devices. Devices different from one another (like pn junctions and MOS structures) are considered. ESA

N92-12188 Politecnico di Milano (Italy). Dipt. di Elettronica.
MOBILE CHARGE AND ELECTRIC FIELD DISTRIBUTIONS IN ABRUPT PN JUNCTIONS: AN APPROACH WITH THE STATE VARIABLE METHOD
A. Castoldi, E. Gatti, A. Longoni, and M. Sampietro 1990 38 p
(Rept-90-051; ETN-91-90244) Avail: Politecnico di Milano, Piazza Leonardo da Vinci 32, 20133 Milan, Italy

Abrupt PN junctions are studied taking the electric field (e) and the potential (p) as state variables. Starting from the Poisson equation, the state variable method determines in closed form the trajectories in the p-e plane, from which a quantitative insight of the properties of the space charge layer is obtained as well as the distribution of the mobile charges and the resulting electric field. In the particular case of asymmetrical junctions, the results show that the dominant contribution to the charge density near the metallurgical junction in the lightly doped side is given by the mobile carriers diffused from the highly doped side. In this case the depletion approximation is of poor accuracy in the evaluation of the electric field distribution. A sharp peak of electric field is present at the junction whose maximum value can be orders of magnitude larger than the value predicted by the depletion approximation. ESA

N92-12189# Sandia National Labs., Albuquerque, NM.
THE BEHAVIOR AND TESTING IMPLICATIONS OF CMOS IC LOGIC GATE OPEN CIRCUITS
C. L. Henderson, J. M. Soden, and C. F. Hawkins (New Mexico Univ., Albuquerque.) 1991 9 p Presented at the International Test Conference, Nashville, TN, 28 Oct. - 1 Nov. 1991
(Contract DE-AC04-76DP-00789)
(DE91-018679; SAND-91-1726C; CONF-9110211-1) Avail: NTIS HC/MF A02

The electrical and test properties of several logic gate open circuit defect structures were measured. Results indicate that tunneling current across fine geometry discontinuities enables low frequency operation of Integrated Circuits (ICs). No significant capacitive coupling was observed for adjacent metal interconnect or for large metal opens on the gate interconnects. These results indicate the need for different methods of open circuit defect detection during test. DOE

N92-12190# Sandia National Labs., Albuquerque, NM.
TESTS ON PHOTOCONDUCTIVE SEMICONDUCTOR SWITCHES FOR SUBNANOSECOND RISETIME, MULTIMEGAVOLT PULSER APPLICATIONS
V. B. Carboni, I. D. Smith, R. M. Pixton, M. D. Abdalla, F. J. Zutavern, G. M. Loubriel, and M. W. OMalley 1991 5 p Presented at the 8th IEEE Pulsed Power Conference, San Diego, CA, 17-19 Jun. 1991
(Contract DE-AC04-76DP-00789)
(DE91-018797; SAND-90-3101C; CONF-910640-45) Avail: NTIS HC/MF A01

Experiments were performed to determine the applicability of photoconductive semiconductor switches (PCSS) for use as output switches in subnanosecond pulse for electromagnetic pulse (EMP) simulators. Lateral switches made of Gallium Arsenide and Silicon with 1.5 cm long insulating regions immersed in Fluorinert were tested in a 50 ohm tri-plate transmission line geometry. Mode locked and Q-switched lasers were used to trigger both a gas switched Marx generator which pulse-charged the transmission line in 100 to 150 ns and to illuminate the PCSS via an optical delay line. Illuminating beam energies and electric field strengths at switchout were varied to determine minimum risetimes and light energies required for triggering. The GaAs switches were operated in the high gain (lock-on) mode. Risetimes as fast as 600 ps were observed using a mode locked laser and 700 ps using a Q-switched laser. The minimum light energy required to trigger GaAs was 22 (mu)J and the highest switched fields for both GaAs and Si is about 60 kV/cm. DOE

N92-12191# Sandia National Labs., Albuquerque, NM.
THERMAL ANALYSIS REPORT OF THE SANDAC V PROCESSOR MODULE
N. M. Nelson Aug. 1991 21 p
(Contract DE-AC04-76DP-00789)
(DE91-018889; SAND-91-1037) Avail: NTIS HC/MF A03

The case and junction temperatures of selected integrated circuits (ICs) on the processor module of the SANDAC V computer were calculated using BETAsoft-R, a personal computer, thermal analysis software program. The predicted data was then compared to corresponding IC case temperature measurements from laboratory tests of a functional SANDAC V computer. Although the difference between the actual and calculated values was somewhat higher than expected, the results of the analysis indicate that BETAsoft-R identified the critical ICs on the processor module and that it is capable of analyzing printed circuit boards for potential thermal problems before the design layout is finalized. DOE

34 FLUID MECHANICS AND HEAT TRANSFER

Includes boundary layers; hydrodynamics; fluidics; mass transfer; and ablation cooling.

For related information see also *02 Aerodynamics* and *77 Thermodynamics and Statistical Physics.*

N92-12192# Brookhaven National Lab., Upton, NY.
HEAT TRANSFER BETWEEN STRATIFIED LIQUIDS WITH BUBBLING ACROSS THE INTERFACE
G. A. Greene, J. C. Chen (Lehigh Univ., Bethlehem, PA.), and T. F. Irvine, Jr. 1990 6 p Presented at the 9th International Heat Transfer Conference, Jerusalem, Israel, 26-31 Aug. 1990
(Contract DE-AC02-76CH-00016)
(DE90-008579; BNL-NUREG-43991; CONF-900803-3) Avail: NTIS HC/MF A02

A situation that arises in the chemical metallurgical, and nuclear power industries is one in which two overlying immiscible liquids are stirred by gas bubbles rising across their interface. Due to the gas bubbling, there are three mixture configurations that may occur which depend primarily upon the physical and transport properties of the two liquids, and the droplet and bubble dynamics. These are the stratified, partially-mixed, and fully-mixed configurations. A model is presented for heat transfer between the liquids in the stratified state. A criterion for the onset of entrainment and a model for the rate of mass entrainment per bubble are also a predictive. These models are combined to develop a predictive capability for the heat transfer across the liquid-liquid interface in the partially-mixed and stratified regimes. DOE

N92-12193# Los Alamos National Lab., NM.
THE AFDM (ADVANCED FLUID DYNAMICS MODEL) PROGRAM: SCOPE AND SIGNIFICANCE
W. R. Bohl, F. R. Parker, D. Wilhelm, and J. Berthier 1990 11 p Presented at the International Topical Meeting on Fast Reactor Safety, Snowbird, 12-16 Aug. 1990
(Contract W-7405-eng-36)
(DE90-010585; LA-UR-90-1285; CONF-900804-11) Avail: NTIS HC/MF A03

The origins and goals of the advanced fluid dynamics model (AFDM) program are described, and the models, algorithm, and coding used in the resulting AFDM computer program are summarized. A sample fuel-steel boiling pool calculation is presented and compared with a similar SIMMER-II calculation. A subjective assessment of the AFDM developments is given, and areas where future work is possible are detailed. DOE

N92-12194# Oak Ridge National Lab., TN.
HARDWARE DEVELOPMENT AND INITIAL SUBASSEMBLY TEST OF A GAS-FIRED STIRLING/RANKINE RESIDENTIAL HEAT PUMP
G. Chen and J. McEntee 1990 7 p Presented at the IECEC Conference, Reno, NV, 7-8 Aug. 1990
(Contract DE-AC05-84OR-21400)
(DE90-012203; CONF-9008117-1) Avail: NTIS HC A02

A gas-fired Stirling/Rankine heat pump is being developed at Sunpower, Inc. The free-piston Stirling engine/magnetic coupling/refrigerant compressor (FPSE/MC/C) assembly used as the power module for this type of heat pump is currently in the assembly and test phase. To achieve high efficiency, low cost, and a more durable system, modifications have been made to a previously introduced design. The modifications include changes in material selection, a different displacer drive, and the use of low-cost and more efficient cooler design. A commercially available R-22 compressor is used in the prototype. Low cost iron-neodymium permanent magnets are used to provide an efficient magnetic coupling design. To match the engine power to the load, a double-acting variable has spring is arranged in parallel with the engine and compressor. After the gas spring was designed and fabricated, it was tested with the compressor. Before system integration and test, the engine/alternator and the compressor/heat pump have been set up and are to be tested separately. DOE

N92-12195# California Univ., Berkeley. Lawrence Berkeley Lab.
MAINTAINING OPTIMUM LIGHT OUTPUT WITH A THERMALLY CONDUCTIVE HEAT PIPE
D. Crawford, R. Verderber, and M. Siminovitch Jun. 1989 5 p Presented at the 1989 IEEE-IAS Annual Conference, San Diego, CA, 1-5 Oct. 1989
(Contract DE-AC03-76SF-00098)
(DE90-012423; LBL-27440; CONF-8910420-1) Avail: NTIS HC/MF A01

This paper describes some of the current research in the area of lamp wall temperature control for the purpose of enhancing light output under elevated temperatures. More specifically, a thermally conductive heat pipe has been employed to maintain optimum lamp wall temperature under varied ambient temperatures. Advantages of a heat pipe over previous methods of enhancing light output include no necessary external power and flexibility in orientation within the fixture. The described experiments include the calibration of heat pipe against a known thermal load, the application of a heat pipe to a lamp in a test chamber, and the placement of a heat pipe within a fixture. Theory and experimental data indicate that optimum lamp operating conditions can be

maintained throughout an ambient temperature range which typically reduces light output by 20 percent. DOE

N92-12196# Westinghouse Electric Corp., Pittsburgh, PA. Science and Technology Center.
ADVANCED STUDY IN SOLID TRANSPORT: RHEOLOGICAL BEHAVIOR OF DENSE SUSPENSION
J. H. Kim, J. L. C. Chen (Pittsburgh Univ., PA.), R. M. Roidt, and H. A. Burgman 17 Jan. 1990 41 p
(Contract DE-AC22-88PC-88949)
(DE90-009025; DOE/PC-88949/T5) Avail: NTIS HC/MF A03

The dynamic shear stress of glass beads has been measured to study the effects of experimental parameters including shearing zone height, water fraction, bead size, and bead size distribution. A method is proposed to obtain the true shear stress from the experimental data. From the results of the experiments, it is concluded that the dynamic shear stress has a maximum or minimum value at some value of each parameter. Void fraction has been measured as a function of applied pressure. Velocity distribution across the shearing zone height has been measured using laser doppler velocimetry. In the next quarter, a study will be done to develop a rheological model by combining the effects of the experimental parameters. In addition, the dynamic shear experiments with coal powder will be started. DOE

N92-12197# Central Research Inst. of Electric Power Industry, Tokyo (Japan).
DEVELOPMENT OF ADVANCED FLOW SIMULATION SYSTEM BY WATER FLOW MODEL
Jun Inumaru, Saburo Hara, Teruhide Hamamatsu, and Toshio Abe May 1989 28 p In JAPANESE; ENGLISH summary
(DE90-503438; CRIE-W-88041) Avail: NTIS (US Sales Only) HC/MF A03

The automatic velocity vectors measurement system used a high speed VTR in flow analyzing system by water flow model which was developed to find the properties of mixed flow in combustion equipment, was newly developed. In this system, the ray through slit was irradiated to the water flow with the tracer of hollow glass particulates and the visualized flow was realized. The density fluctuation of the two points on picture image which is continuously taken at 10 msec space, and flow velocity was measured by the correlation with the both stated above. The direction of the flow was determined by the angle in which coefficient of correlation is maximum when one of these points was turned. It was found that the spaces of data sampling was shortened from 33 to 19 mses, and they were capable to be measured up to 3 m/s of comparatively high speed, and application to usual flow experiment became to be possible. It was found that the speed vector obtained by the application to axial symmetric impact jet, coincides with the result of the existing experiment or calculation, and the vector became quantitively proper to actual turbulent flow. DOE

N92-12198# Texas Univ., Austin. Inst. for Fusion Studies.
STOCHASTIC AND COLLISIONAL DIFFUSION IN TWO-DIMENSIONAL PERIODIC FLOWS
I. Doxas (Colorado Univ., Boulder.), W. Horton, and H. L. Berk May 1990 16 p
(Contract DE-FG05-80ET-53088)
(DE90-014335; DOE/ET-53088/338; IFSR-338) Avail: NTIS HC/MF A03

The global effective diffusion coefficient D* for a two-dimensional system of convective rolls with a time dependent perturbation added, is calculated. The perturbation produces a background diffusion coefficient D, which is calculated analytically using the Menlikov-Arnold integral. This intrinsic diffusion coefficient is then enhanced by the unperturbed flow, to produce the global effective diffusion coefficient D*, which we can calculate theoretically for a certain range of parameters. The theoretical value agrees well with numerical simulations. DOE

N92-12199 Toledo Univ., OH.
AN EXPERIMENTAL ANALYSIS OF LATERAL JET INJECTION INTO CONFINED SWIRLING CROSSFLOWS Ph.D. Thesis
Bradley W. Fintel 1991 330 p
Avail: Univ. Microfilms Order No. DA9122419

Recently, attention has been devoted to better understanding the complex flows inherent to gas turbine combustors so that fuel efficiency and flame stability may be enhanced. As a contributing factor to the success of these two endeavors, the laterally oriented diffusion jets must be characterized accurately. The current experiment measures lateral jets as injected into a variety of axisymmetric and nonaxisymmetric flowfields using Laser Doppler Anemometry (LDA) and characterizes the general flowfield behavior through the laser sheet method of flow visualization. The investigation also introduces an alternate means of effectively simulating the resulting jet trajectory in a confined circular crossflow. Through a dimensional analysis of the measured data, it was concluded that the jet penetration distances, z/D(sub j), for the nonswirling crossflow cases were found to be best represented in terms of a jet to crossflow momentum ratio, J, and an axial distance, x/D(sub j), according to: z/D(sub j) = 1.373(J)(exp 0.3882)(x/D(sub j))(exp 0.3878). A three dimensional force balance approach was also investigated. The jet trajectory was deduced from the path of a solid sphere. The sphere diameter was found to be a function of the trajectory and the jet to crossflow velocity ratio. The agreement reached between data presented herein and results of previous 2D analyses utilizing conventional hot wire anemometry and pilot probe techniques lends credibility to the LDA measurement technique. Furthermore, it has been demonstrated how a two color, two component LDA data acquisition system offers a desirable alternative for obtaining velocity measurements within a confined rotating flow. In addition, the drag force analogy coupled with the numerical method analyses were found to provide a low cost means of estimating three dimensional jet trajectories for a wide range of crossflow conditions. Dissert. Abstr.

N92-12200 Stanford Univ., CA.
AN EXPERIMENTAL TECHNIQUE FOR INVESTIGATION OF INSTANTANEOUS WALL HEAT FLUX TO A TURBULENT BOUNDARY LAYER IN WATER Ph.D. Thesis
Andrew B. Carlson 1991 250 p
Avail: Univ. Microfilms Order No. DA9122520

The objective was to develop a new transducer capable of making accurate time resolved measurements of wall heat flux in a laboratory water channel. The developed heat flux measurement system is similar in form to hot-wire anemometers. The mode of operation is to maintain a sensing element at fixed temperature and then monitor the power required. This active control approach results in the frequency response of the overall system that is faster than the passive thermal response of the sensor. To maintain constant property conditions in water requires an overall temperature difference of 2 C. It was shown that operation is feasible under this condition of very lower overheat. The sensing device was a specially fabricated silicon disk element. The disk was mounted flush with the surface of the heat transfer test plate to provide a smooth flow surface and to minimize unheated boundaries around the sensor. The chip was fabricated to provide even heat release over the entire surface area. By using a low doping density for the silicon integrated resistors, a temperature coefficient of resistance of 4500 ppm/c was achieved. Measurements of wall heat flux from a constant temperature wall to a turbulent boundary layer in water were performed. The comparison of the power spectral density of the measured heat flux suggests that the critical range of temporal frequencies of the instantaneous heat flux were resolved. Dissert. Abstr.

N92-12201 Oxford Univ. (England).
EFFECTS OF WAKE AND SHOCK PASSING ON THE HEAT TRANSFER TO A FILM COOLED TRANSONIC TURBINE BLADE Ph.D. Thesis
M. J. Rigby 1990 225 p
Avail: Univ. Microfilms Order No. BRD-92714

An attempt is made to further the understanding of film cooling

process in an engine environment. The environment in a gas turbine is unsteady. A source of unsteadiness, the cutting of nozzle guide vane (NGV) wakes and shock waves by the rotor, was modeled experimentally. The influence of the unsteady wakes and shock waves on the heat transfer to a film cooled rotor blade was studied for five film cooling configurations using a rotating bar apparatus in front of a 2-D cascade. Heat transfer measurements were made using thin film gauges placed at the mid-span of the test blade. Schlieren photography was used to study the behavior of the coolant film and the movement of the unsteady shock waves and wakes. The effect of simulated NGV wake passing observed on the uncooled airfoil is to promote an intermittent transition of the suction surface. The effect of the wake on the turbulent pressure surface is small. With injection on the suction surface, the film acts as a boundary layer trip which offsets the rise in heat transfer due to the wake. The simulated NGV trailing edge shock wave had a dramatic effect on the suction surface heat transfer.

Dissert. Abstr.

N92-12202 Florida Univ., Gainesville.
FLUID OSCILLATIONS AND ENHANCED HEAT TRANSFER IN A PARALLEL PLATE CHANNEL BOUNDED BY END RESERVOIRS MAINTAINED AT DIFFERENT TEMPERATURE Ph.D. Thesis
Alex Xiaoxin Zhao 1990 130 p
Avail: Univ. Microfilms Order No. DA9121691

Existing analytic and experimental studies have shown that sinusoidal oscillations of a viscous fluid within open ended conduits connected to reservoirs can enhance the thermal diffusivity between the hot fluid and cold fluid in the opposite end reservoirs by some four orders of magnitude in excess of that possible in the absence of oscillation. The heat transfer coefficients achieved can be very high and can readily exceed those possible via heat pipes, yet involve no net convective mass exchange. A numerical study is presented of laminar oscillating flows of incompressible viscous fluid and the associated enhanced heat transfer in a 2-D parallel plate channel bounded by rectangular end reservoirs which have sinusoidally oscillating piston boundaries and are maintained at different temperatures. A change of the widely used SIMPLE algorithm, termed SIMPLE-TP (Time Periodic), was developed to take time periodicity and boundary movements into account. Two different models of heat supply and removal, conduction through the reservoir walls and convection by cross flow, were considered. The numerical results obtained were compared with analytic solutions where such comparisons were possible. Dissert. Abstr.

N92-12203 Oxford Univ. (England).
HEAT TRANSFER AND INSTRUMENTATION STUDIES ON ROTATING TURBINE BLADES IN A TRANSIENT FACILITY Ph.D. Thesis
William D. E. Allan 1990 244 p
Avail: Univ. Microfilms Order No. BRD-92608

The current demands of modern aviation have encouraged engine manufacturers to develop larger, more powerful, yet quieter and more fuel efficient gas turbine engines. This has promoted particular interest in the heat loads borne by turbines, for efficiency can be improved if turbine entry temperature is increased. Presently, ceilings for this parameter are set by the thermal properties of the blade materials and their internal cooling capabilities. It has been established that flow unsteadiness and secondary flows in the turbine passages greatly influence the heat transfer rate on turbine blades and endwall surfaces. The three-dimensionality of the rotating turbine flowfield, however, complicates the interaction of these unsteady effects and their combined role in heat transfer on turbine blades. To fulfill the need to study this complex fluid environment, a model turbine stage has been installed in the working section of the Isentropic Light Piston Tunnel at Oxford. This transient facility enables the rotor to be operated at engine representative conditions. Novel high density instrumentation has been development for use on the turbine blade. Both the production and calibration of the thin film gauges will be explained and the theory supporting heat transfer measurement using this instrumentation is presented in this thesis. Perhaps the most important feature of this thesis lies in the extensive mean and unsteady heat transfer rates measured on the blade profile. These were determined on a total of 5 streamlines and represent a significant contribution to the total experimental data available on 3-dimensional profiles at engine representative conditions.

Dissert. Abstr.

N92-12204 Stanford Univ., CA.
NUMERICAL SIMULATION OF COMPRESSIBLE HOMOGENEOUS TURBULENCE Ph.D. Thesis
Gregory Allan Blaisdell 1991 441 p
Avail: Univ. Microfilms Order No. DA9122516

Interest in hypersonic flight has fostered a need to increase our understanding of turbulence and mixing in high Mach number flows. This work is to aid the development of turbulence models for compressible flows by using direct numerical simulations of compressible homogeneous turbulence and homogeneous shear flow. The numerical simulations of compressible isotropic turbulence show that compressibility effects are highly dependent on the initial conditions. For this reason, decaying compressible isotropic turbulence is difficult to model. The shear flow simulations, on the other hand, show that the measures of compressibility evolve to become independent of their initial values and are parametized by the rms Mach number. Therefore, simulations of homogeneous shear flow are useful in evaluation compressibility effects. The growth rate of the turbulence in compressible homogeneous shear flow is reduced compared to that in the incompressible case. This behavior is similar to that of compressible mixing layers. The reduced growth rate is the result of an increase in the dissipation rate of turbulent kinetic energy due to the divergence of the velocity. Additionally, kinetic energy is transferred to pressure fluctuations by the pressure dilatation correlation. Examination of the structure of compressible homogeneous shear flow reveals the presence of eddy shocklets. These structures are important for the increased dissipation rate of compressible turbulence. The simulations included a passive scalar so that mixing could be studied. The major finding concerning passive scalar transport is that the dilatational velocity does not contribute to mixing. This result indicates that compressible turbulence is less efficient at mixing than incompressible turbulence. Dissert. Abstr.

N92-12205 California Univ., Davis.
NUMERICAL SOLUTION OF INCOMPRESSIBLE NAVIER-STOKES EQUATIONS USING A VELOCITY-VORTICITY FORMULATION Ph.D. Thesis
Jennifer Samson Dacles 1991 126 p
Avail: Univ. Microfilms Order No. DA9125092

An effort to assess the efficiency, accuracy, and applicability of the numerical and computational simulation of the incompressible Navier Stokes equations using the velocity/vorticity formulation is described. This is accomplished by developing numerical algorithms using finite difference, finite element, and finite volume methods applied to structured and unstructured grids, two dimensional and three dimensional flows, steady and unsteady problems. The steady two dimensional flow algorithms use a least squares approach and a finite element method on a structured grid. A mixed finite element/finite volume method is developed for the unstructured grid. A finite difference method using a staggered grid formulation on a cartesian mesh is considered for comparison. The large computer memory requirement imposed by the direct solution method leads to the development of an odd-even block relaxation technique applicable to a finite difference formulation on a staggered and structured grid and the use of a domain decomposition method. Domain decomposition in conjunction with parallel computers can be used as an acceleration technique or as a way to resolve flow problems by using more grid points without intensive memory requirements . The three dimensional extension considers two different algorithms. The Sequential Algorithm solves each of the Poisson's equations for the velocity followed by a solution of a scalar convection/diffusion equation for the vorticity components. The Block Implicit Algorithm recasts the governing equations into a form suitable for a plane relaxation method. The two velocity components and a vorticity component

are solved implicitly in each of the planes. The flow problems used for validation include the flow over a backward facing step, a driven cavity with a box, and a weakly separated channel. The three dimensional driven cavity is also considered as well as the flow over a three dimensional backward facing step in a channel.
Dissert. Abstr.

N92-12206 Oxford Univ. (England).
BLADE SURFACE PRESSURE MEASUREMENTS ON THE ROTOR OF A MODEL TURBINE STAGE IN A TRANSIENT FLOW FACILITY Ph.D. Thesis
Anthony John Dietz 1990 251 p
Avail: Univ. Microfilms Order No. BRD-92632

Detailed measurements of the flow through the high pressure stage of a gas turbine engine are required to further the understanding of this complex flow field. A study of the turbine blade surface pressures is reported. Measurements were made of the time averaged and unsteady pressures in a model turbine stage. A blade instrumentation technique was used to make the pressure measurement. Detailed performance testing and calibration of the instrumentation are presented. The surface pressure measurements were made about the midheight streamline of the rotor blade. The time averaged measurements were presented in the form of a blade isentropic Mach number distribution. The results were compared with previous studies of 2-D linear cascades with the same blade profile. Analysis of the unsteady pressure fluctuations included phase locked averages and cross correlations of the data. The effects of wake passing and shock wave passing on the blade surface pressures were detected. The results were compared with previous theoretical analysis and experimental studies of these effects.
Dissert. Abstr.

N92-12207*# Stanford Univ., CA. Dept. of Chemical Engineering.
COMBINED BUOYANCY-THERMOCAPILLARY CONVECTION Final Report
G. M. Homsy 1990 41 p
(Grant NAG8-71501)
(NASA-CR-187417; NAS 1.26:187417) Avail: NTIS HC/MF A03 CSCL 20D

Combined buoyancy-thermocapillary convection was studied in 2D and 3D. Fluid motion caused by thermally induced tension gradients on the free surface of a fluid is termed thermocapillary convection. It is well-known that in containerless processing of materials in space, thermocapillary convection is a dominant mechanism of fluid flow. Welding and crystal growth processes are terrestrial applications where thermocapillary convection has direct relevance.
Author

N92-12208 ESDU International Ltd., London (England).
BOILING INSIDE TUBES: SATURATED WET-WALL HEAT TRANSFER WITH MIXTURES
Aug. 1991 26 p
(ESDU-91011; ISBN-0-85679-773-1; ISSN-0141-402X) Avail: ESDU

ESDU 91011 discusses an estimation method for boiling heat transfer of multi component mixtures. The method in ESDU 91011 is based on the method in ESDU 85041 for a single component flow. After a discussion of the unique features introduced in mixture boiling, caused by the quality change as the lightest component vaporizes, a step by step calculation procedure is given to obtain the heat flux or the length of the tube to vaporize a certain proportion of liquid. A detailed worked example illustrates the use of the method. The accuracy of the predictions is briefly discussed on the basis of limited available measurements and the accuracy of the method for single component flow.
ESDU

N92-12209# Oak Ridge Y-12 Plant, TN.
EXTRACTION APPARATUS WITH PULSED COLUMNS FOR MONITORING DISPERSED PHASE
Koji Aiba, Katsunori Ouchi, and Takahiro Okuma (Sumitomo Metal Mining Co. Ltd., Tokyo, Japan) 1991 9 p Transl. into ENGLISH of Japanees Patent No. 1-148304, (9 Jun. 1989)
(Contract DE-AC05-84OS-21400)
(DE91-017680; Y/TR-91/35) Avail: NTIS HC/MF A02

The invention pertains to a method and extraction apparatus with pulsed columns for monitoring the dispersed phase that calculates by means of using ultrasonic waves the dispersion that forms on the boundary between the light liquid phase and the heavy liquid phase in the pulsed columns. With the invention, the outer wall of the pulsed column of an extraction tower is irradiated with ultrasonic waves, the radioactive waves or the transmitted waves are received, and the dispersion of the dispersed phase in the pulsed columns is calculated on the basis of the level of radioactive or transmitted waves.
DOE

N92-12210# Centre d'Etudes et de Recherches, Toulouse (France). Dept. d'Etudes et de Recherches en Aerothermodynamique.
BOUNDARY LAYER TRANSITION Final Report [TRANSITION DE LA COUCHE LIMITE. RAPPORT FINAL]
F. Laburthe and D. Arnal Jan. 1991 43 p In FRENCH
(Contract DRET-89-002-00-40)
(CERT-RTS-55/5018-45; ETN-91-90077) Avail: NTIS HC/MF A03

The linearized theory of laminar instability is used to analyze the properties of boundary layer stabilities developing on angled cylinders placed in supersonic flow. The calculations correspond to two series of experiments: one carried out in the R3 wind tunnel (Mach number 10) and the other in the quiet tunnel (Mach Number 3.5). The stability of the separating line, wall temperature effect, streak development, and problems related to instability modeling were specifically studied.
ESA

N92-12211# Centre d'Etudes et de Recherches, Toulouse (France). Dept. d'Etudes et de Recherches en Aerothermodynamique.
TURBULENCE CONTROL BY INTAKE Final Report [CONTROLE DE LA TURBULENCE PAR ASPIRATION. RAPPORT FINAL]
G. Pailhas Jan. 1991 41 p In FRENCH
(Contract STPA-85-95-009-66)
(CERT-RF-67/5004-37; ETN-91-90078) Avail: NTIS HC/MF A03

Results from the first part of an experimental study aimed at establishing the effects of a local intake by slots on a turbulent boundary layer are reported. Measurements were taken on the wall of a test vein of an Eiffel type wind tunnel. Results show that a local wall intake leads to a significant decrease of deflection type fluctuations of longitudinal velocity in the internal region of the boundary layer region where the turbulent production is maximum.
ESA

N92-12212*# Sverdrup Technology, Inc., Brook Park, OH.
VORTICITY DYNAMICS OF INVISCID SHEAR LAYERS Final Report
Jeffrey W. Yokota Oct. 1991 13 p Proposed for presentation at the 30th Aerospace Sciences Meeting, Reno, NV, 6-9 Jan. 1992; sponsored by AIAA
(Contract NAS3-25266)
(NASA-CR-189042; E-6621; NAS 1.26:189042; AIAA-91-0420)
Avail: NTIS HC/MF A03 CSCL 20D

The inviscid evolution of a two dimensional shear layer is simulated numerically by a scheme based on a kinematic decomposition of the unsteady flow. Lagrangian and Weber transformations of the incompressible Euler equations result in a Clebsch representation that separates the flow field into rotational and irrotational components. These transformations produce the initial construction of the flow field and define its subsequent evolution.
Author

N92-12213# National Research Council of Canada, Ottawa (Ontario). Inst. for Aerospace Research.
TURBULENT BOUNDARY LAYER SOLUTION FOR TWO-DIMENSIONAL COMPRESSIBLE FLOW USING MIXING LENGTH AND K-EPSILON TURBULENCE MODELS
M. Khalid Nov. 1990 31 p
(AD-A233771; NRC-32135; IAR-AN-69; CTN-91-60263)
Copyright Avail: NTIS HC/MF A03

This report contains outlines of two methods for calculating the boundary layer characteristics. The continuity, momentum and energy equations for two-dimensional compressible turbulent boundary layers are solved using the k-epsilon (turbulent kinetic energy - dissipation rate) turbulence model and the extended mixing length approach to calculate the shear stress terms. The finite difference equations are set up applying Keller's box scheme and the resulting tridiagonal matrix system is solved by the block elimination method. Newton's iteration procedure is used to converge the solution. Results obtained from computations showed only slight difference between the two methods. Both methods showed satisfactory agreement with experimental data for test cases. Author (CISTI)

N92-12214# National Research Council of Canada, Ottawa (Ontario). Gas Dynamics Lab.
TURCOM: A COMPUTER CODE FOR THE CALCULATION OF TRANSIENT, MULTI-DIMENSIONAL, TURBULENT, MULTI-COMPONENT CHEMICALLY REACTIVE FLUID FLOWS. PART 2: COMPRESSIBLE AND COMBUSTING FLOW
K. Y. M. Lai Jul. 1988 55 p
(NRC-29287-Pt-2; NRC-TR-GD-012-Pt-2; CTN-91-60287)
Copyright Avail: NTIS HC/MF A04

This report describes the methodology and structure used in the TURCOM computer program, for solving the equations of multi component chemically reactive and turbulent fluid flows. The methodology is based on the numerical solution of the governing equations of mass, momentum, chemical species and energy. The ideal gas mixture relation is used to link the temperature, pressure and density of the flow. For turbulent flow, additional equations are solved for turbulence kinetic energy and its dissipation rate. Flame chemistry assumes a number of species and chemical reactions. The latter are subdivided into finite-rate reaction steps and a one step irreversible reaction whose rate is controlled by a combination of mixing and global kinetics. The present report describes combusting and compressible flows. It outlines the mathematical model used and summarizes the numerical procedure to obtain the solution. The complete structure of the computer program is described. A sample prediction of bluff-body stabilized turbulent combustion is given. Author (CISTI)

N92-12215# Centre d'Etudes Aerodynamiques et Thermiques, Poitiers (France).
STUDY OF A TECHNIQUE OF LOW LEVEL TURBULENCE DETECTION Final Report [ETUDE D'UNE TECHNIQUE DE DETECTION DE BAS NIVEAUX DE TURBULENCE. RAPPORT FINAL]
R. Leblanc, V. Mercier, M. Riethmuller, and R. Decuypere (Ecole Royale Militaire, Brussels, Belgium) Sep. 1990 40 p In FRENCH
(Contract DRET-87-1187)
(ETN-91-90107) Avail: NTIS HC/MF A03

A laser velocimetry technique developed to measure low level turbulence is described. The ultimate objective of the research is to detect the surface layer limit on a model in a transonic air flow. The use of laser velocimetry in the study of turbulence should allow turbulence of a few thousands in size to be detected. The detectors used in the study prove to be too large to detect the minute transition in the surface limit layer which is very thin for the Reynolds numbers considered. The excellent potential of the method for measuring low level turbulence is however stressed. ESA

N92-12216# Institut de Mecanique des Fluides de Lille (France).
STUDY OF DETACHED TURBULENT FLOW IN AN AIR INTAKE BY MEANS OF HIGH SPEED TOMOGRAPHY AND LASER VELOCIMETRY [ETUDE DE L'ECOULEMENT TURBULENT DECOLLE DANS UNE PRISE D'AIR EN INCIDENCE PAR TOMOGRAPHIE ULTRA-RAPIDE ET PAR VELOCIMETRIE LASER]
M. Stanislas, T. Laden, and J. C. Monnier 20 Dec. 1990 33 p In FRENCH
(Contract DRET-86-003)
(Rept-90/55; ETN-91-90108) Avail: NTIS HC/MF A03

The internal flow in the air intake of high speed aircraft is studied. Air flow at high speed tends to become detached from the sides of the intake leading to important perturbations in furnishing enough air to the engine and in maintaining constant compressor performance. The output coefficients of the intake are studied in order to better understand the internal flow. Laser velocimetry is used to better understand the internal flow. The dimensions of the intake inlet on the model are measured in order to be able to carry out mathematical modeling of the flow. ESA

N92-12217# Technische Hochschule, Darmstadt (Germany, F.R.). Fachbereich Mathematik.
TIME STEPPING PROCEDURES FOR THE NONSTATIONARY STOKES EQUATIONS
Werner Varnhorn Feb. 1991 22 p
(Preprint-1353; ETN-91-90185) Avail: NTIS HC/MF A03

First and second order implicit time stepping procedures for the nonstationary Stokes equations in bounded domains of R(exp 3) are considered. Using energy estimates optimal convergence properties in the Sobolev spaces H(sup m)(G) (m 0,1,2) uniformly in time are proven, provided that the Stokes solution has a certain degree of regularity. Here in the case of the second order scheme (Crank-Nicholson method) the Stokes solution has to satisfy a nonlocal compatibility condition at initial time t = 0, which can be satisfied by a special initial construction. ESA

N92-12218# Technische Hochschule, Darmstadt (Germany, F.R.). Fachbereich Mathematik.
TIME DELAY AND FINITE DIFFERENCES FOR THE NONSTATIONARY NONLINEAR NAVIER-STOKES EQUATIONS
Werner Varnhorn Mar. 1991 30 p
(Preprint-1359; ETN-91-90186) Avail: NTIS HC/MF A03

A time delay epsilon greater than 0 is used for an energy conserving approximation of the nonlinear term of the nonstationary Navier-Stokes equations. It is proved that the corresponding initial value problem N sub epsilon in smoothly bounded domains (G is contained in R(3)) is well posed. A semi-discretized difference scheme for (N sub epsilon) initial value problem is studied and convergence of optimal order on the Sobolev space H2(G) is proved. Passing to the limits epsilon towards 0, it is shown that the sequence of stabilized solutions has an accumulation point such that it solves the Navier-Stokes problem N sub omicron in a weak sense (Hopf). ESA

N92-12219# Technische Hochschule, Darmstadt (Germany, F.R.). Fachbereich Mathematik.
EXISTENCE OF THREE DIMENSIONAL, STEADY, INVISCID, INCOMPRESSIBLE FLOWS WITH NONVANISHING VORTICITY
Hans-Dieter Alber Mar. 1991 53 p
(Preprint-1365; ETN-91-90187) Avail: NTIS HC/MF A04

Steady flow of an inviscid, incompressible medium through a bounded, simply connected domain is studied. Solutions with non-vanishing vorticity are constructed for a boundary value problem. ESA

N92-12220# Westinghouse Hanford Co., Richland, WA.
A COMPARISON OF THREE METHODS FOR SOLVING FLOW EQUATIONS OF TWO IMMISCIBLE FLUIDS IN VARIABLY SATURATED MEDIA
M. G. Piepho and A. K. Runchal (Analytic and Computational Research, Inc., Los Angeles, CA.) Jul. 1991 8 p Presented

at the 3rd Symposium on Multiphase Transport in Porous Media, Atlanta, GA, 1-6 Dec. 1991
(Contract DE-AC06-87RL-10930)
(DE91-016945; WHC-SA-1289; CONF-911244-1) Avail: NTIS HC/MF A02

Three alternate methods are compared for numerically solving the coupled flow equations for two immiscible fluids in variably saturated media. The three alternate methods are (1) the Picard method, (2) the logmean method, and (3) a modified Picard method. All three methods were used to simulate an experiment with transmission oil infiltrating sand. Different time-step sizes were used for each method, and mass-balance accuracy is compared for each time-step size and method at various time values during the transient infiltration. Also, simulated contours of oil mass, using the modified Picard method, are compared to the experimental contours. DOE

N92-12221# Oak Ridge National Lab., TN.
HEAT-TRANSFER MATERIAL
Masahito Katayama, Hiroshi Sato, Yoshihisa Takizawa, Masanobu Asaoka, and Tsugihiro Fukuda (Canon, Inc., Tokyo, Japan) 1991 28 p Transl. into ENGLISH of Japanese Patent No. SHO 63(1988)-309493, (16 Dec. 1988)
(Contract DE-AC05-84OR-21400)
(DE91-017723; ORNL/tr-91-13) Avail: NTIS HC/MF A03

The present invention concerns heat transfer material used for heat transfer recording, especially heat transfer material providing good recorded images on a substrate of poor surface smoothness, and the images can be corrected by a liftoff correction tape that produces adhesive properties when heated. DOE

N92-12222# Argonne National Lab., IL.
COMMIX-1AR/P: A THREE-DIMENSIONAL TRANSIENT SINGLE-PHASE COMPUTER PROGRAM FOR THERMAL HYDRAULIC ANALYSIS OF SINGLE AND MULTICOMPONENT SYSTEMS
R. N. Blomquist, P. L Garner, and E. M. Gelbard Jul. 1991 138 p
(Contract W-31-109-eng-38)
(DE91-018703; ANL-90/45) Avail: NTIS HC/MF A07

The COMMIX-1AR/P computer code is designed for analyzing the steady-state and transient aspects of single-phase fluid flow and heat transfer in three spatial dimensions. This version is an extension of the modeling in COMMIX-1A to include multiple fluids in physically separate regions of the computational domain, modeling descriptions for pumps, radiation heat transfer between surfaces of the solids which are embedded in or surround the fluid, a k-(var epsilon) model for fluid turbulence, and improved numerical techniques. The porous-medium formulation in COMMIX allows the code to be applied to a wide range of problems involving both simple and complex geometrical arrangements. The basic equations, underlying assumptions, and solution techniques are presented for the entire computer code, covering both old and new features. DOE

N92-12223# City Univ. of New York, NY.
PERIODICALLY STRUCTURED MULTIPHASE FLOWS AND HYDRODYNAMIC INSTABILITIES IN NARROW CAPILLARIES
C. Maldarelli May 1991 70 p
(Contract DE-FG02-88ER-13820)
(DE91-018802; DOE/ER-13820/1) Avail: NTIS HC/MF A04

This is the final report of the research completed under the auspices of the Department of Energy grant Periodically Structured Multiphase Flows and Hydrodynamic Instabilities in Narrow Capillaries. The research studies the mobility of train flows of fluid slugs moving in narrow capillaries. This type of flow regime often develops in enhanced oil recovery applications when saturating oil is removed from rock pores by displacing with a second immiscible phase which is usually an aqueous surfactant solution. The exact type of flow pattern which emerges as the gaseous phase displaces the saturating oil depends on whether the oil or the aqueous solution preferentially wets the pore walls. If the oil is more strongly wetting, then the displacement takes the form of a winding train of long aqueous slugs separated by pools of oil and riding over a thin cushion of the oil. Alternatively, if the aqueous solution is more strongly wetting, then the fluids change places, and the displacement consists of slugs of oil moving over an aqueous film. The effectiveness of the oil removal is largely a function of the mobility of the slug train as is transverses the rock bed. If the train frequently gets stuck, or slows down considerably in places, then the aqueous solution is unable to effectively remove the oil. This research focuses on two factors which control the slug train mobility, the absorption of surfactants onto the slug interfaces and the stability of the thin cushions or wetting layers along which the slugs move. DOE

N92-12224# Los Alamos National Lab., NM. Reaction Science Group.
LAGRANGIAN ANALYSIS, DATA COVARIANCE, AND THE IMPULSE TIME INTEGRAL
Charles A. Forest 1991 9 p Presented at the 1991 American Physical Society Conference on Shock Compression of Condensed Matter, Williamsburg, VA, 17-20 Jul. 1991
(Contract W-7405-eng-36)
(DE92-000169; LA-UR-91-3135; CONF-9107105-52) Avail: NTIS HC/MF A02

Lagrangian analysis is mathematical analysis of data derived from flow experiments in which embedded gauges move with the material motion (constant Lagrangian mass-point coordinate). With sufficient data, the conservation laws of mass, momentum, and energy are applied to the data in order to construct flow-variable fields, of particle velocity, stress, density, et cetera. Toward this end, a new Lagrangian analysis method has been constructed, that is centered upon a function, (alpha), that incorporates conservation of mass and momentum into its definition. Further, the existence of (alpha) allows simultaneous, consistent, least-squares fitting of surfaces to all of the flow data. The method also incorporates a novel treatment of the data covariance effects resulting from gauge-to-gauge calibration uncertainty. Analysis of a synthetic data set illustrates the method. DOE

N92-12225# Los Alamos National Lab., NM.
RICHTMYER-MESHKOV INSTABILITY OF SHOCKED GASEOUS INTERFACES
Robert F. Benjamin, Didier Besnard, and Jean-Francois Haas (Commissariat a l'Energie Atomique, Villeneuve-Saint-Georges, France) 1991 7 p Presented at the 18th International Symposium on Shock Waves, Sendai (Japan), 21-26 Jul. 1991
(Contract W-7405-eng-36)
(DE92-000308; LA-UR-91-2876; CONF-9107138-3) Avail: NTIS HC/MF A02

The instability of shocked and reshocked perturbed interface between gases of different densities is analyzed by comparing flow visualization from 2D and 3D shock-tube experiments with 2D numerical simulations and theory. The shadowgraphs and calculations show similar large scales of mixing by fluid interpenetration induced by the Richtmyer-Meshkhov instability. In 2D, experimental instability growth following acceleration by the initial shock is less than calculated by linear theory or simulated. The 3D experiments are approximately simulated by 2D calculations with an increased initial amplitude of the interface. The kinetic energy of the interpenetrating velocity field from the simulations are also compared to a theoretical estimate derived from the linear theory. DOE

N92-12226# Oak Ridge National Lab., TN.
EXPERIMENTAL ANALYSIS OF DIRECT-EXPANSION GROUND-COUPLED HEAT PUMP SYSTEMS
V. C. Mei and V. D. Baxter Sep. 1991 15 p Presented at the International Energy Agency (IEA) Workshop on Ground-Source Heat Pumps, Montreal (Canada), 12-13 Aug. 1991
(Contract DE-AC05-84OR-21400)
(DE92-000420; CONF-9108169-1) Avail: NTIS HC/MF A03

Direct-expansion ground-coil-coupled (DXGC) heat pump systems have certain energy efficiency advantages over conventional ground-coupled heat pump (GCHP) systems. Principal

among these advantages are that the secondary heat transfer fluid heat exchanger and circulating pump are eliminated. While the DXGC concept can produce higher efficiencies, it also produces more system design and environmental problems (e.g., compressor starting, oil return, possible ground pollution, and more refrigerant charging). Furthermore, general design guidelines for DXGC systems are not well documented. A two-pronged approach was adopted for this study: (1) a literature survey, and (2) a laboratory study of a DXGC heat pump system with R-22 as the refrigerant, for both heating and cooling mode tests done in parallel and series tube connections. The results of each task are described in this paper. A set of general design guidelines was derived from the test results and is also presented. DOE

35 INSTRUMENTATION AND PHOTOGRAPHY

Includes remote sensors; measuring instruments and gages; detectors; cameras and photographic supplies; and holography.

For aerial photography see *43 Earth Resources and Remote Sensing.* For related information see also *06 Aircraft Instrumentation,* and *19 Spacecraft Instrumentation.*

N92-12227# Sandia National Labs., Albuquerque, NM.
MICROSENSOR RESEARCH
R. C. Hughes, ed. and C. G. Drebing, ed. Apr. 1990 16 p
(Contract DE-AC04-76DP-00789)
(DE90-011801; SAND-90-0048) Avail: NTIS HC/MF A03

The technology that led to very large scale integrated circuits on silicon chips also provides a basis for new microsensors that are small, inexpensive, low power, rugged, and reliable. Two examples of microsensors Sandia is developing that take advantage of this technology are the microelectronic chemical sensor array and the radiation sensing field effect transistor (RADFET). Increasingly, the technology of chemical sensing needs new microsensor concepts. Applications in this area include environmental monitoring, criminal investigations, and state-of-health monitoring, both for equipment and living things. Chemical microsensors can satisfy sensing needs in the industrial, consumer, aerospace, and defense sectors. The microelectronic chemical-sensor array may address some of these applications. We have fabricated six separate chemical gas sensing areas on the microelectronic chemical sensor array. By using different catalytic metals on the gate areas of the diodes, we can selectively sense several gases. DOE

N92-12228# Sandia National Labs., Albuquerque, NM.
UNATTENDED OPTICAL SURVEILLANCE EQUIPMENT
D. L. Mangan, C. S. Johnson, and S. L. Schneider 1990 5 p Presented at the 6th Annual Symposium and Technical Displays on Physical and Electronic Security, Philadelphia, PA, 30 Jul. - 2 Aug. 1990
(Contract DE-AC04-76DP-00789)
(DE90-013403; SAND-90-0983C; CONF-9007112-3) Avail: NTIS HC/MF A01

In many security situations, it is necessary to utilize unattended optical surveillance systems. Sandia National Laboratories has developed three optical surveillance systems which operate in the unattended surveillance mode. The first of these systems is known as the Modular Integrated Video System (MIVS). The MIVS is a microprocessor controlled video system which records scenes at selectable intervals. Each scene consists of six to ten frames recorded on a 8 mm videotape. A MIVS video recorder has the capacity to record approximately 26,000 scenes. Scenes can be recorded at intervals ranging from 1 to 99 minutes between recordings. The unit has been designed for permanent installation with facility power. The camera can be located up to 30 m from the recording module with the authentication technology protecting the cable connecting the camera to the recording unit. The Portable Surveillance unit (PSU) is a second system which has been designed for unattended operation. The PSU is designed for situations where quick set up of an optical surveillance device is required. The PSU operates in a manner similar to the MIVS and can be operated off of facility power for long time periods, or from an internal battery pack for short term surveillance applications. The Video Surveillance Unit (VSU) provides similar capabilities for permanent rack mounted installations. This paper describes the MIVS, the PSU, and the VSU, and discusses potential applications for the system. Equipment for reviewing the videotapes produced by the systems is also described. DOE

N92-12229# Lawrence Livermore National Lab., CA.
ERROR ANALYSIS OF A RATIO PYROMETER BY NUMERICAL SIMULATION
G. R. Gathers May 1990 22 p Presented at the 2nd Workshop on Subsecond Thermophysics, Torino (Italy), 20-21 Sep. 1990
(Contract W-7405-eng-48)
(DE90-011500; UCRL-102750; CONF-9009152-2) Avail: NTIS HC/MF A03

A numerical method has been devised to evaluate measurement errors for a three channel ratio pyrometer as a function of temperature. The pyrometer is simulated by computer codes, which can be used to explore the behavior of various designs. The influence of the various components in the system can be evaluated. General conclusions can be drawn about what makes a good pyrometer, and an existing pyrometer was evaluated, to predict its behavior as a function of temperature. The results show which combination of two channels gives the best precision. DOE

N92-12230# Lawrence Livermore National Lab., CA.
ERROR ANALYSIS BY NUMERICAL SIMULATION FOR A THREE-COLOR PYROMETER ASSUMING A BLACKBODY SPECTRUM AND A WAVELENGTH AND TEMPERATURE DEPENDENT EMISSIVITY
G. R. Gathers May 1990 20 p Presented at the 2nd Workshop on Subsecond Thermophysics, Torino (Italy), 20-21 Sep. 1990
(Contract W-7405-eng-48)
(DE90-011504; UCRL-102751; CONF-9009152-1) Avail: NTIS HC/MF A03

A numerical method devised to test ratio pyrometers has been used to explore the fitting of a blackbody spectrum and an emissivity model that assumes linear wavelength dependence and arbitrary temperature dependence. The slope and intercept coefficients for the emissivity and the temperature form three unknowns. The equations for the output of the three channels can be solved simultaneously for the emissivity coefficients and the temperature at any given time using the corresponding measured channel outputs. The stability of the solution is tested as a function of the temperature and equipment characteristics. DOE

N92-12231*# Alabama Univ., Huntsville. Materials Processing Lab.
MODIFICATIONS TO THE RAPID MELT/RAPID QUENCH AND TRANSPARENT POLYMER VIDEO FURNACES FOR THE KC-135 Final Report
Guy A. Smith, Sue E. Kosten, and Gary L. Workman 9 Feb. 1990 33 p
(Contract NAS8-36955)
(NASA-CR-184215; NAS 1.26:184215) Avail: NTIS HC/MF A03 CSCL 14B

Given here is a summary of tasks performed on two furnace systems, the Transparent Polymer (TPF) and the Rapid Melt/Rapid Quench (RMRQ) furnaces, to be used aboard NASA's KC-135. It was determined that major changes were needed for both furnaces to operate according to the scientific investigators' experiment parameters. Discussed here are what the problems were, what was required to solve the problems, and possible future enhancements. It was determined that the enhancements would be required for the furnaces to perform at their optimal levels. Services provided include hardware and software modifications, Safety DataPackage documentation, ground based testing, transportation to and from Ellington Air Field, operation of hardware during KC-135 flights, and post-flight data processing. Author

N92-12232 Department of the Navy, Washington, DC.
POSITION AND VELOCITY MEASURING SYSTEM Patent
Thomas P. Riley, inventor (to Navy), Martin Buffman, inventor (to Navy), and Reginald J. Cyr, inventor (to Navy) 16 Apr. 1991 8 p Filed 16 Mar. 1989
(AD-D014975; US-Patent-5,008,860; US-Patent-Appl-SN-336452; US-Patent-Class-367-6) Avail: US Patent and Trademark Office CSCL 17/11

A position and velocity determining system, that uses two functioned receiver-transmitters. In performing a first function, each receiver-transmitter transmits an acoustic pulse at a unique frequency, in response to a first received acoustic pulse. In performing a second function, each receiver-transmitter transmits a continuous acoustic signal at a unique frequency, in response to a second received acoustic pulse. Author (GRA)

N92-12233# National Research Council of Canada, Ottawa (Ontario). Engine Lab.
CALIBRATION OF AN FTI OMNITRAK BALLISTIC FLOW CALIBRATOR SYSTEM
W. Grabe and J. Carvish Aug. 1988 76 p
(NRC-29847; NRC-TR-Eng-002; CTN-91-60294) Copyright Avail: NTIS HC/MF A05

In 1983, the Engine Laboratory of the National Research Council (NRC) of Canada acquired an Omnitrak ballistic calibrator for calibrating its own turbine fuel flowmeters, and eventually those of other Canadian users, as a national facility. Initially, the manufacturer's calibration had been used. In the spring of 1987, the Omnitrak was calibrated by Engine Laboratory personnel for the first time. The report documents all aspects of this calibration for future reference and, more importantly, for traceability of the calibration accuracy. Very close agreement was established between the manufacturer's and NRC's calibration factors, when compared on the basis of identical correction procedures. The original oversight of a small balance correction by the manufacturer was identified and taken into account. Author (CISTI)

N92-12234# National Research Council of Canada, Ottawa (Ontario). Photonics and Sensors Section..
THE NRCC THREE-DIMENSIONAL IMAGE DATA FILES
M. Rioux and L. Cournoyer Jun. 1988 132 p In ENGLISH and FRENCH
(NRC-29077; CTN-91-60308) Avail: NTIS HC/MF A07

This book contains a catalogue of illustrations related to three dimensional image data files taken at the National Research Council of Canada laboratories. The images were taken with a camera based on a synchronized scanner recently developed at the Division of Electrical Engineering. The purpose of the work is to provide computer scientists with a bank of three dimensional images which can be used in research activities such as (1) integration of multiple views of the same object to form a model, (2) creation of a library of object models to investigate searching algorithms, and (3) image description, development of iterative processes to measure, manipulate, and edit 3-D information. The images are available on magnetic tape or on diskette. A description of the camera and its imaging modes is included. CISTI

N92-12235# Aerospatiale, Suresnes (France). Dept. Materiaux.
DESIGN, MANUFACTURE, AND CALIBRATION OF FOUCAULT CURRENT SENSORS [CONCEPTION-FABRICATION-ETALONNAGE DES SONDES COURANTS DE FOUCAULT]
H. Chailleux, J. P. Choffy, and I. Molinero 7 Sep. 1990 52 p In FRENCH
(Contract STPA-88-96-009)
(DCR/M-51739/F-90; ETN-91-90111) Copyright Avail: NTIS HC/MF A04

The development and production of Foucalt current sensors for low frequencies (between 1 and 3 kHz) is described. These sensors are to be used in fault detection of sheet assemblies between 1 and 5 mm in thickness. Nine sensors are produced. Three coils without a central core demonstrate that the ferrite core improves the magnetic coupling between the sensor and the panel studied by approximately 50 percent, and the detection of a fault by about 14 dB. The electric characteristics measured by means of an impedance meter seem to provide good indication of the quality of the sensors during both production and operating phases. ESA

N92-12236# Laboratoire d'Automatique et d'Analyse des Systemes, Toulouse (France).
PYROELECTRIC DETECTORS PROCESSED ON POLYVINYLIDENE FLUORIDE AND ON COPOLYMER, INTEGRATED ON SILICON SUBSTRATE: TECHNOLOGICAL APPROACH OF INFRARED UNIT SENSORS AND MATRIX ARRAYS Ph.D. Thesis - Inst. National des Sciences Appliquees
Essaid Bousibiat 1991 178 p In FRENCH; ENGLISH summary
(LAAS-91134; ETN-91-90123) Avail: NTIS HC/MF A09

The advantage of pyroelectric detectors over infrared semiconductor sensors for industrial applications is considered. Low cost and room temperature working conditions has pushed ahead the investigation of new pyroelectric material like polar polymers. PolyVinylidene fluoride (PVDF) and copolymers are analyzed in that context, the objective being to examine the technological way to follow in order to elaborate a focal plane matrix array. Successive problems are detailed concerning material polarization, integration on a silicon substrate, and optoelectrical characterization of unit sensors and matrix arrays. If the PVDF integrated technology gives good reproducible performances, the copolymer at the first steps of the study seems more promising for this application as it is available under a liquid form, allowing its deposition on the silicon substrate through the standard process developed in microelectronics, whereas PVDF, is to be stuck on this read out support. The process of various types of multilayer structures allows a wide analysis of the sensitivity of the sensor to parameters like voltage and current responses, detectivity, and crosstalk to be presented. ESA

N92-12237# Laboratoire d'Automatique et d'Analyse des Systemes, Toulouse (France). Systemes Integres de Perception.
STUDY AND DEVELOPMENT OF A PRESSURE AND ACCELERATION SENSOR USING A PIEZOELECTRIC POLYMER (PVDF) Ph.D. Thesis - Toulouse Univ. [ETUDE ET REALISATION D'UN CAPTEUR DE PRESSION ET D'ACCELERATION UTILISANT UN POLYMER PIEZOELECTRIQUE (PVDF)]
Elie Partouche 1991 162 p In FRENCH; ENGLISH summary
(LAAS-91154; ETN-91-90124) Avail: NTIS HC/MF A08

Development of a sensor used in measuring very strong acceleration beyond 10,000 g with stress higher than 1 kbar is described. PolyVinyliDene Fluoride (PVDF) is chosen for its higher piezoelectric coefficients, it's good mechanic characteristics and it's high temporal stability. The four fundamental steps involved in producing the sensors are described. These are metalization, polarization, electric characterization and connection to the electronics. Testing of the sensors on test benches using the operating principle of Hopkinson's bars is described. The test results show some problems with the sensors in these strong accelerometry conditions. ESA

N92-12238# Laboratoire d'Automatique et d'Analyse des Systemes, Toulouse (France).
DESIGN AND DEVELOPMENT OF PROPRIOCEPTIVE SENSORS TO BE USED FOR MOBILE ROBOT LOCALIZATION Ph.D. Thesis - Inst. National des Sciences Appliquees [CONCEPTION ET MISE EN OEUVRE D'UN SYSTEME DE CAPTEURS PROPRIOCEPTIFS DESTINE A LA LOCALISATION RELATIVE DES ROBOTS MOBILES]
Andre Ferrand 1991 205 p In FRENCH; ENGLISH summary
(LAAS-91178; ETN-91-90125) Avail: NTIS HC/MF A10

Proprioceptive sensors designed for use in the localization functions of mobile robots are described. The robots for which the sensors are designed may be required to climb small obstacles or small inclined planes. The sensor system is designed to provide

five localization parameters, namely three attitude angles, yaw, roll and pitch, and two parameters of position on a horizontal plane. For this purpose, an odometer with inertial sensors is used along with a gyroscope and accelerometers. The odometer works independently of the robot locomotion. The gyroscope controls the odometer's measurements during the climbing of an obstacle and, when necessary, rectifies them. ESA

N92-12239*# Alabama Univ., Huntsville.
OPTICAL STUDIES IN THE HOLOGRAPHIC GROUND STATION Final Report, 21 Sep. 1990 - 20 Sep. 1991
Gary L. Workman 9 Oct. 1991 22 p
(Contract NAS8-36955)
(NASA-CR-184257; NAS 1.26:184257) Avail: NTIS HC/MF A03 CSCL 20F

The Holographic Group System (HGS) Facility in rooms 22 & 123, Building 4708 has been developed to provide for ground based research in determining pre-flight parameters and analyzing the results from space experiments. The University of Alabama, Huntsville (UAH) has researched the analysis aspects of the HGS and reports their findings here. Some of the results presented here also occur in the Facility Operating Procedure (FOP), which contains instructions for power up, operation, and powerdown of the Fluid Experiment System (FES) Holographic Ground System (HGS) Test Facility for the purpose of optically recording fluid and/or crystal behavior in a test article during ground based testing through the construction of holograms and recording of videotape. The alignment of the optical bench components, holographic reconstruction and and microscopy alignment sections were also included in the document for continuity even though they are not used until after optical recording of the test article) setup of support subsystems and the Automated Holography System (AHS) computer. The HGS provides optical recording and monitoring during GCEL runs or development testing of potential FES flight hardware or software. This recording/monitoring can be via 70mm holographic film, standard videotape, or digitized images on computer disk. All optical bench functions necessary to construct holograms will be under the control of the AHS personal computer (PC). These include type of exposure, time intervals between exposures, exposure length, film frame identification, film advancement, film platen evacuation and repressurization, light source diffuser introduction, and control of realtime video monitoring. The completed sequence of hologram types (single exposure, diffuse double exposure, etc.) and their time of occurrence can be displayed, printed, or stored on floppy disk posttest for the user. Author

N92-12240# Aerospatiale, Cannes (France). Space and Strategic Systems Div.
NEW CONCEPT FOR A HIGHLY-COMPACT IMAGING FOURIER TRANSFORM SPECTROMETER (IFTS)
D. Simeoni 1991 13 p Presented at the SPIE Symposium on OE/Aerospace Sensing, Orlando, FL, 1-5 Apr. 1991 Submitted for publication
(Rept-911-440-110; ETN-91-90270) Avail: NTIS HC/MF A03

The design of a new generation of interferometer with two input and output channels, combining the advantages of a simplified optical design with highly compact geometry and enhanced system performance is investigated. The optical design is characterized as follows: direct location of the interferometer in the frontend optics' focal plane, location of the fringes outside the interferometer (thereby directly over the detector plane), and optimization capability with a relatively low aperture number. The system level performance of an on board imaging Fourier Transform Spectrometer (FTS) based on such an interferometer is discussed. ESA

N92-12241 National Physical Lab., Teddington (England). Div. of Electrical Science.
LINEARISATION OF DIODE DETECTORS FOR USE IN A MULTISTATE REFLECTOMETER
M. Perkins and R. D. Pollard (Leeds Univ., England) Oct. 1990 27 p
(NPL-DES-104; ISSN-0143-7305; ETN-91-90296) Copyright Avail: National Physical Lab., Teddington, TW11 0LW, England

Diode detectors offer many advantages for high frequency power measurement when compared with thermistor sensors, but they suffer from a nonlinear response as a function of incident power. A method to linearize the response of waveguide diode detectors is reported. The application of this method is assessed by the comparison of complex reflection coefficient measurements in the frequency range 26.5 to 40 GHz using a multistate reflectometer with both thermistor and diode detection. ESA

N92-12242* Max-Planck-Inst. fuer Physik und Astrophysik, Garching (Germany, F.R.).
THE MPE/UCB FAR-INFRARED IMAGING FABRY-PEROT INTERFEROMETER (FIFI)
A. Poglitsch, J. W. Beeman, N. Geis, Reinhard Genzel, M. Haggerty, E. E. Haller, J. Jackson, M. Rumitz, G. J. Stacey, and C. H. Townes (California Univ., Berkeley.) Mar. 1991 46 p
(Grant NAG2-208)
(NASA-CR-185495; NAS 1.26:185495; MPE-Preprint-201; ETN-91-90313) Copyright Avail: Max-Planck Inst. fuer Physik und Astrophysik, 8046 Garching, Fed. Republic of Germany CSCL 14B

FIFI is an imaging spectrometer with two or three Fabry Perot Interferometers (FPI) in series for airborne astronomical observations in the far infrared range (wavelength = 40 to 200 microns). It employs 5 by 5 arrays of photoconducting detectors and offers spectral resolutions as small as 2 km/s. Resolution and bandwidth can be set over a wide range to match a variety of astronomical sources. Cryogenic optics minimizes thermal background radiation and provides for inflight step tunable spatial resolution. The frequency chopping mode of the high resolution Fabry Perot allows for line detection in extended objects. Absolute internal flux calibration ensures adequate flat fielding of the array elements. ESA

N92-12243# Sandia National Labs., Albuquerque, NM.
SANDIA SEVERE ELECTROSTATIC DISCHARGE TESTER: VERSION 3 (SSET), SERIAL NUMBER 1
J. R. Barnum 31 Jul. 1991 48 p
(Contract DE-AC04-76DP-00789)
(DE91-018582; SAND-91-1865) Avail: NTIS HC/MF A03

This report documents the as-built operational performance of Sandia's Severe Electrostatic Discharge Tester Version-3 (SSET-3) SN:2 and lists the hardware and additional documentation delivered to Division 2174 on July 31, 1991. (The supplied items are listed.) The primary emphasis of this report is to provide a qualitative and quantitative evaluation of the SSET against requirements derived from the Severe Human Body ESD model (SHBESD), which is defined in terms of an equivalent circuit and a short-circuit current waveform. This report also presents supporting information on the calibration and verification of ancillary equipment used to assess the operation of the SSET. While the documentation of the verification and calibration of ancillary equipment is somewhat lengthy, it is considered necessary because the SSET may be used in situations where its output characteristics will be critically scrutinized. Thus, the supporting documentation is necessary to lend credibility to the performance/verification measurements made on the SSET. DOE

N92-12051# Pennsylvania State Univ., University Park. Propulsion Engineering and Research Center.
PLANAR LASER IMAGING OF SPRAYS FOR LIQUID ROCKET STUDIES
W. Lee, S. Pal, H. M. Ryan, P. A. Strakey, and Robert J. Santoro *In* JHU, The 27th JANNAF Combustion Subcommittee Meeting, Volume 1 Nov. 1990 p 611-621 Sponsored in part by DOE
(For primary document see N92-12048 03-20)
Avail: NTIS HC/MF A99

N92-12427*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, MD.
THE MODERATE RESOLUTION IMAGING SPECTROMETER: AN EOS FACILITY INSTRUMENT CANDIDATE FOR APPLICATION OF DATA COMPRESSION METHODS
Vincent V. Salomonson *In its* Space and Earth Science Data Compression Workshop Nov. 1991 p 13-23 (For primary document see N92-12425 03-59)
Avail: NTIS HC/MF A05 CSCL 14B

36 LASERS AND MASERS

Includes parametric amplifiers.
For related information see also *76 Solid-State Physics.*

N92-12244# Consultec Scientific, Inc., Knoxville, TN.
LASER SPECTROSCOPY: ASSESSMENT OF RESEARCH NEEDS FOR LASER TECHNOLOGIES APPLIED TO ADVANCED SPECTROSCOPIC METHODS
G. S. Hurst May 1990 73 p
(Contract DE-AC01-88ER-30131)
(DE90-011788; DOE/ER-0461P) Avail: NTIS HC/MF A04

This report is organized as follows. Section 2 summarizes the current program of DOE's Office of Health and Environmental Research (OHER) and provides some remarks on how laser science and technology could beneficially impact most of the research programs. Section 3 provides a brief global perspective on laser technology and attempts to define important trends in the field. Similarly, Section 4 provides a global perspective on laser spectroscopy and addresses important trends. Thus, Section 5 focuses on the trends in laser technology and spectroscopy which could impact the OHER mission in significant ways and contains the basis for recommendations made in the executive summary. For those with limited familiarity with laser technology and laser spectroscopy, reference is made to Appendix 1 for a list of abbreviations and acronyms. Appendix 2 can serve a useful review or tutorial for those who are not deeply involved with laser spectroscopy. Even those familiar with laser spectroscopy and laser technology may find it useful to know precisely what the authors of this document mean by certain specialized terms and expressions. Finally, a note on the style of referencing may be appropriate. Whenever possible a book or review articles is referenced as the preferred citation. However, we frequently found it useful to reference a number of individual papers of recent origin or those which were not conveniently found in the review articles. DOE

N92-12245# Oak Ridge National Lab., TN.
WORKSHOP ON SCIENTIFIC AND INDUSTRIAL APPLICATIONS OF FREE ELECTRON LASERS
F. C. Difilippo and R. B. Perez May 1990 48 p Workshop held in Oak Ridge, TN, 12-13 Jun. 1989
(Contract DE-AC05-84OR-21400)
(DE90-012038; ORNL/TM-11380) Avail: NTIS HC/MF A03

A Workshop on Scientific and Industrial Applications of Free Electron Lasers was organized to address potential uses of a Free Electron Laser in the infrared wavelength region. A total of 13 speakers from national laboratories, universities, and the industry gave seminars to an average audience of 30 persons during June 12 and 13, 1989. The areas covered were: Free Electron Laser Technology, Chemistry and Surface Science, Atomic and Molecular Physics, Condensed Matter, Biomedical Applications, Optical Damage, and Optoelectronics. DOE

N92-12246# International Centre for Theoretical Physics, Trieste (Italy).
THE CHARACTERS OF SLAB LASERS
Xuanhui Lu and Shaomin Wang Oct. 1989 13 p
(DE90-625397; LAMP-89/2) Avail: NTIS (US Sales Only) HC/MF A03

A viewpoint of Zig-Zag slab lasers having intrinsic pseudoconjugate properties due to total internal reflection is proposed and demonstrated. The compensating ability of slab laser against the optical distortion is analysed. The modes of slab solid-state lasers are derived by a new concept. Fundamental, high-order transverse modes, beam divergences, and diffraction loss are remarkable differences in different directions. However, longitudinal modes are asymmetrical standing waves. DOE

N92-12247# Los Alamos National Lab., NM.
THREE-DIMENSIONAL PARTICLE-IN-CELL MODELING OF RELATIVISTIC ELECTRON BEAM PRODUCTION AND TRANSPORT FOR KrF LASER PUMPING
M. E. Jones and V. A. Thomas 1990 7 p Presented at the 8th International Conference on High-Power Particle Beams, Novosibirsk (USSR), 2-5 Jul. 1990
(Contract W-7405-eng-36)
(DE90-013050; LA-UR-90-2170; CONF-9007111-7) Avail: NTIS HC/MF A02

The effects of diode geometry and externally applied magnetic fields on electron beam production and transport for KrF laser pumping has been studied using two and three dimensional particle-in-cell models. The efficiency with which electrons may be transported through the foil support structure depends critically on the size of the openings in the structure as well as the magnitude of the applied magnetic fields. As the electron diodes become larger the current which can be produced becomes limited by the self-magnetic field of the beam. Simulations show the diode current is limited to slightly more than the usual critical current. However this electron flow is found to be unstable. The application of strong guide fields not only increases the current from the diode but tends to stabilize the electron beam. DOE

N92-12248# Tri-Univ. Meson Facility, Vancouver (British Columbia).
THE LASER SYSTEM OF THE OPTICALLY PUMPED ION SOURCE AT TRIUMF
C. D. P. Levy, R. Burge, M. Mouat, S. Sarkar, P. W. Schmor, N. Wilkinson, R. Dehaven, and A. N. Zelenskii (Academy of Sciences, USSR, Moscow) Feb. 1990 7 p Presented at the International Workshop on the Polarized Ion Sources and Polarized Gas Jets, Tsukuba-Shi (Japan), 12-17 Feb. 1990
(DE90-013102; TRI-PP-90-8; CONF-900289-5) Avail: NTIS (US Sales Only) HC/MF A02

The optically pumped ion source at TRIUMF relies on laser optical pumping of a sodium vapor charge exchange cell for polarization. The laser system is described. DOE

N92-12249# Los Alamos National Lab., NM.
PULSED LASER FLUOROMETRY FOR ENVIRONMENTAL MONITORING
G. C. Saunders, J. C. Martin, J. H. Jett, M. E. Wilder, A. Martinez, B. F. Bentley, J. Lopez, and L. Hutson 1990 43 p Presented at the Applied Biotechnology, Haifa, Israel, 24-28 Jun. 1990
(Contract W-7405-eng-36)
(DE90-013163; LA-UR-90-2075; CONF-9006219-1) Avail: NTIS HC/MF A03

A compact pulsed laser fluorometer has been incorporated into a continuous flow system developed to detect acetylcholinesterase (AChE) inhibitors and/or primary amine compounds in air and water. A pulsed nitrogen laser pumped dye laser excites fluorescent reactants which flow continuously through a quartz flow cell. Data are collected, analyzed, and displayed using a Macintosh II personal computer. For detection of cholinesterase inhibitors the fluorogenic substrate N methylindoxyl acetate is used to monitor the activity of immobilized enzyme. Presence of inhibitors results in a decrease of steady state fluorescence. Detection of compounds containing primary amines is based on their reaction with fluorescamine to rapidly produce intensely fluorescent products. Compounds of interest to our research were amino acids, peptides, and proteins. An increase in steady state fluorescence could be cause to evaluate the reasons for the change. The detection limit of the protein, bovine serum albumin (BSA) in water, is 10 ppT. Nebulized BSA concentrated

by the LANL air sampler can be detected at sub ppT original air concentration. DOE

N92-12250 Department of the Navy, Washington, DC.
METHOD AND APPARATUS FOR PRODUCING A PHOTOPUMPED VUV LASER IN Mo(6+) ION-CONTAINING PLASMA Patent
Uri Feldman, inventor (to Navy) and Joseph Reader, inventor (to Navy) 3 Jul. 1990 6 p Filed 15 Nov. 1989
(AD-D014961; US-Patent-4,939,744; US-Patent-Appl-SN-436839; US-Patent-Class-372-76) Avail: US Patent and Trademark Office

It is an object of the present invention to provide a novel method and apparatus for producing a laser. It is an additional object of the present invention to provide a method and apparatus for producing a VUV laser having a wavelength less than about 1000 Angstroms. It is a further object of the invention to provide a method and apparatus for producing an inexpensive source of coherent radiation in the 60 nm region. It is an additional object of the invention to provide a method and apparatus for producing a photopumped laser while employing the wavelength coincidence of two ions of molybdenum. These and additional objects are provided by the method and apparatus according to the present invention for producing a photopumped VUV laser in an Mo6 + ion-containing plasma. GRA

N92-12251 Department of the Navy, Washington, DC.
NARROW-BANDWIDTH DIFFRACTION-LIMITED COUPLED STABLE-UNSTABLE RESONATOR LASER CAVITY Patent
John F. Reintjes, inventor (to Navy), Lawrence L. Tankersley, inventor (to Navy), David G. Cooper, inventor (to Navy), and James L. Dexter, inventor (to Navy) 30 Apr. 1991 7 p Filed 27 Sep. 1990
(AD-D014974; US-Patent-5,012,483; US-Patent-Appl-SN-589142; US-Patent-Class-372-95) Avail: US Patent and Trademark Office CSCL 09/3

A laser cavity providing high power laser radiation with diffraction-limited divergence and narrow-band-width comprises: a stable laser cavity including a gain medium, which generates and amplifies laser radiation, optically coupled to first and second reflectors and an optical coupler; and an unstable laser cavity including the gain medium, the first reflector, the optical coupler and a scraper mirror. The scraper mirror is located between the gain medium and the optical coupler for producing an output beam. The stable laser cavity is restricted to operate on a low order TEM mode by an aperture located between the optical coupler and the second reflector. A frequency narrowing element located between the optical coupler and the second reflector narrows the bandwidth of the laser radiation in the stable laser cavity. The optical coupler couples the narrow bandwidth laser radiation from the stable laser cavity to the unstable laser cavity, thereby producing narrow bandwidth laser radiation in the output beam.
Author (GRA)

N92-12252# National Research Council of Canada, Ottawa (Ontario). Div. of Electrical Engineering.
A SYSTEM FOR CALIBRATING THE WRIST-MOUNTED LASER RANGE FINDER
S. Amid, B. Trethewey, and C. Archibald Nov. 1988 70 p
(NRC-29799; NRC-ERB-1012; CTN-91-60280) Avail: NTIS HC/MF A04

The wrist-mounted laser range finder provides depth information which is distorted due to the scanning mechanisms and the perspective distortion present in all range finding devices. For the wrist-mounted scanner in particular, this problem is pernicious because of the large depth of field for which this sensor is designed. Methods of removing the nonlinearities to provide an orthographic projection have been developed for other range finders, but for a variety of reasons, these have been found unsatisfactory. A new method, apparatus, and procedure for calibration are described in this paper. Linear interpolation over multiple known samples of uncalibrated data are used to build a lookup table. The lookup table, stored in RAM, is accessed in realtime using the scanner hardware to provide calibrated data at a rate of 15 calibrated scans per second. One of the biggest advantages of the procedure that is described is that it is very easy to use and relatively fast.
Author (CISTI)

N92-12253# Technische Hochschule, Darmstadt (Germany, F.R.). Fachbereich Physik.
LASERABLE KrF(*)-EXCIMER DISCHARGE WITH INTEGRATED PREIONIZATION Ph.D. Thesis [LASERFAEHIGE KRF ASTERISK-EXCIMERENTLADUNG MIT INTEGRIERTER VORIONISIERUNG]
Stefan Zoepfel 1990 86 p In GERMAN
(ETN-91-90177) Avail: NTIS HC/MF A05

The possibility of constructing excimer lasers without additional pre-ionization is outlined. It is shown that the properties of the utilized insulating material are important for the start and the progress of pre-ionization discharge. The experimental data on temporary discharge progress are in agreement with the theoretical model, in the framework of measurement accuracy, when the influence of helium radiation is examined. The formation of hot spots is attributed to high volume charge fields before the electrodes. It is shown that volume charges originate from photoelectrons. The claim for compatibility of discharge stability at high power density, amplification mechanism and radiation quality, e.g., optical homogeneity is fulfilled, with regard to the new pre-ionization type. ESA

N92-12254# Norwegian Defence Research Establishment, Kjeller.
A TUNABLE CONTINUOUS-WAVE TITANIUM-DOPED SAPPHIRE LASER
Ove Lyngnes 22 May 1991 120 p
(FFI-91/7006; ISSN-0802-2437; ETN-91-90257) Avail: NTIS HC/MF A06

Theoretical and experimental studies of a continuous wave titanium doped sapphire (Ti(3+):Al2O3) laser pumped by an Ar ion laser are presented. Different resonator designs were investigated theoretically. A four mirror design was found to be the best, giving an output beam with a low degree of astigmatism and a small mode volume within the Brewster cut Ti(3+):Al2O3 crystal used in the work. The thermal effect resulting from thermal focusing of the resonator mode and the pump beam in the crystal were estimated and found to have a significant effect on the resonator stability. An expression relating the pump power and the output power was also found and used to optimize the resonator parameters. A Ti(3+):Al2O3 laser was built on the basis of the theoretical analysis. The experimental results obtained with this laser compared well with the calculated results. A maximum output power of 1.1 W was obtained with a pump power of 5 W incident on the crystal. A birefringent filter was used for wavelength tuning. Tuning was demonstrated with two different sets of mirrors in the ranges 715 nm to 880 nm and 920 nm to 1040 nm. By using other mirrors in the resonator and lowering the resonator losses, the tunning range could have been extended. The performance of the laser was found to be comparable to that of commercially available Ti(3+):Al2O3 lasers. ESA

N92-12255# Aerospatiale, Cannes (France).
POTENTIAL OF TUNEABLE LASERS FOR OPTIMISED DUAL-COLOUR LASER RANGING
Glenn Lund and Jean Gaignebet (Observatoire de la Cote d'Azur, Nice, France) 1991 11 p
(Rept-911-440-111; ETN-91-90271) Avail: NTIS HC/MF A03

Some of the essential features of dual color laser ranging are highlighted with a view to clarifying the role played by the various wavelength dependant parameters which intervene in the overall system accuracy. Results derived from numerical simulations of link budget, used to analyze the expected performance of a tuned dual wavelength ranging system are presented. ESA

N92-12256# Aerospatiale, Cannes (France).
TOWARD THE OPTIMISATION OF PASSIVE GROUND TARGETS IN SPACEBORNE LASER RANGING

Glenn Lund and Herve Renault 1991 14 p
(Rept-911-440-112; ETN-91-90272) Avail: NTIS HC/MF A03

A concept for a passive multiple retroreflector target dedicated to high accuracy laser ranging between an orbiting payload and a planetary surface is described. The target can provide, with certain field of view restrictions, good emulation of an ideal retroreflector. The described design relies on an optimization of each reflectometer in terms of the corrections for velocity aberration needed within its particular field of view, and is highly suited to systems with predictable orbital patterns. ESA

N92-12257# Sandia National Labs., Albuquerque, NM.
AN ASTIGMATIC UNSTABLE RESONATOR WITH AN INTRACAVITY DEFORMABLE MIRROR
D. R. Neal, P. L. McMillin, and R. B. Michie 1991 10 p Presented at the Society of Photo-Optical Instrumentation Engineers (SPIE) Meeting, San Diego, CA, 21-26 Jul. 1991
(Contract DE-AC04-76DP-00789)
(DE91-018815; SAND-91-2850C; CONF-9107115-50) Avail: NTIS HC/MF A02

Many side-pumped lasers exhibit significant index gradients across the gain region aperture. For pulsed lasers where these gradients are time dependent, extraction with good beam quality requires the use of an adaptive optic. Since these inhomogeneities are systematic, wavefront correction can be performed with a model deformable mirror. We have designed a resonator which uses a cylindrically deformable mirror to correct for wavefront aberrations in a pulsed nuclear-reactor-driven laser. The mirror is capable of correcting up to ten waves of cylindrical focus error while maintaining tip/tilt alignment of the resonator. It is based around the flat plate bending using magnetostrictive actuators. A cylindrical intracavity beam expander is used to image the DM into the laser gain region. The beam expander can be adjusted to vary the resonator magnification in one axis, or to control the stability of the resonator. The mirror is controlled closed loop using a four channel wavefront sensor and a digital control system. DOE

N92-12258# Lawrence Livermore National Lab., CA.
LAWRENCE LIVERMORE NATIONAL LABORATORY UNDERWATER LASER IMAGING SYSTEM (UWLIS) DEVELOPMENT PROJECT
T. J. Kulp, D. Garvis, and R. Kennedy 1991 31 p
(Contract W-7405-eng-48)
(DE91-019001; UCRL-21217) Avail: NTIS HC/MF A03

This report provides a summary of the second in-water test of the Lawrence Livermore National Laboratory NAVSEA Underwater Laser Imaging System (UWLIS). The UWLIS is a laser-based, synchronous-scanning, underwater imaging device that is designed to operate at greater ranges than is possible with conventional underwater TV cameras. It differs from earlier prototype synchronous-scanning systems in that it is capable of producing real-time, RS-170 video images. It is being developed for eventual use on Remotely Operated Vehicles (ROVs) during deep-ocean Naval salvage missions. The floodlight-illuminated television cameras presently used on NAVSEA vessels can produce images at ranges up to about 2 attenuation lengths (An attenuation length is the distance light must travel to be reduced to 1/e of its original intensity. It is typically 20 to 30 m in clear water). Beyond that point, backscattered illumination (common-volume backscatter) from particles in the intervening seawater between the imager and the target overwhelms the return signal, and the image is lost. The special optical geometry of the synchronous-scanning imager is designed to minimize common-volume effects. Previous theoretical studies indicate that a system of this type should be capable of operation at distances as great as 6 to 7 attenuation lengths. An improvement of this magnitude would greatly increase the efficiency of salvage operations, thus decreasing their cost. DOE

N92-12259# Los Alamos National Lab., NM.
IMPROVED KrF LASER DESIGN FOR THE LABORATORY MICROFUSION FACILITY
D. B. Harris, J. A. Sullivan, J. H. Pendergrass, N. A. Kurnit, E. A. Rose, and J. McLeod 1991 37 p Presented at the 14th IEEE Symposium on Fusion Engineering, San Diego, CA, 30 Sep. - 3 Oct. 1991
(Contract W-7405-eng-36)
(DE92-000171; LA-UR-91-3115; CONF-910968-4) Avail: NTIS HC/MF A03

A conceptual design of the KrF laser-driven Laboratory Microfusion Facility (LMF) has been completed. LASNEX calculations predict an indirect-drive target yield of 400 MJ from the 3-MJ, 480-beam driver system. Nine final amplifiers with individual output energy of 412 kJ are used. The total cost of the KrF laser-driven LMF is estimated by an independent cost assessment to be $921 million in 1992 dollars. DOE

N92-12260# Los Alamos National Lab., NM.
PROGRESS WITH THE SLOTTED-TUBE PULSED MICROWIGGLER
R. W. Warren 1991 13 p Presented at the 13th International Free-Electron Laser (FEL) Conference, Santa Fe, NM, 25-30 Aug. 1991
(Contract W-7405-eng-36)
(DE92-000173; LA-UR-91-3112; CONF-9108118-6) Avail: NTIS HC/MF A03

A pulsed microwiggler can produce a wiggler field of unusually short period and high strength. A period of a few millimeters and a field of 5 appear possible. A satisfactory design is hard to realize, however, for many reasons: the high current, the current nonuniformities caused by the skin effect, thermal stresses in the parts, the high precision, etc. In addition, measuring the field with adequate resolution in the time domain, as well as in all three spatial coordinates, is challenging, particularly inside the small bore of a microwiggler. This paper presents recent design modifications that illustrate new solutions to these problems, and details of the construction, testing, and performance of wigglers already built. DOE

N92-12261# Los Alamos National Lab., NM.
RAPID DEVELOPMENT OF A MEASUREMENT AND CONTROL SYSTEM FOR THE ADVANCED FREE-ELECTRON LASER
W. L. Wilson, Jr., M. W. May, and A. J. Kozubal 1991 7 p Presented at the 13th International Free-Electron Laser (FEL) Conference, Santa Fe, NM, 25-30 Aug. 1991
(Contract W-7405-eng-36)
(DE92-000178; LA-UR-91-3092; CONF-9108118-4) Avail: NTIS HC/MF A02

The Experimental Physics and Industrial Control System (EPICS) is being used to develop a measurement and control system for the Advanced Free-Electron laser (AFEL) at the Los Alamos National Laboratory. EPICS is an integrated system of applications development tools and a distributed run time environment that supports an input-output database, a graphical operator interface, sequential control through state definition, data archiving, data analysis, and fault management. It is very advantageous in terms of both time and system integrity to be able to perform much of the control system development before the actual hardware for the AFEL is in place. Using the EPICS applications tools, we are developing prototype measurements and controls that can be directly transferred to the AFEL during installation and commissioning. This is possible due primarily to three aspects of EPICS. First we can easily model physical systems with the state notation language. Second, we can simulate input and output channels with soft database channels, which are created using the database configuration tool. Third, we can easily build and modify operator interface screens with the display editor. DOE

N92-12262# Los Alamos National Lab., NM.
PHYSICS DESIGN OF THE HIGH BRIGHTNESS LINAC FOR THE ADVANCED FREE-ELECTRON LASER INITIATIVE AT LOS ALAMOS
R. L. Sheffield, M. J. Browman, B. E. Carlsten, and L. M. Young 1991 19 p Presented at the 13th International Free-Electron Laser (FEL) Conference, Santa Fe, NM, 25-30 Aug. 1991

(Contract W-7405-eng-36)
(DE92-000179; LA-UR-91-3091; CONF-9108118-5) Avail: NTIS HC/MF A03

Free electron lasers and high energy physics accelerators have increased the demand for very high brightness electron beam sources. This paper describes the design of an accelerator which can produce beams of greater than 7 x 10(exp 11) A/m(exp 2) (brightness equals 2 asterisk 1/(var epsilon)(sup 2), with (var epsilon) equals 90 percent normalized emittance equals 4 asterisk rms emittance). The beam emittance growth in the accelerator is minimized by the following: producing a short electron bunch in a high gradient RF cavity, using a focusing solenoid to correct the emittance growth due to space charge, and designing the coupling slots between accelerator cavities to minimize quadruple effects. The simulation code PARMELA was modified for this design effort. This modified version uses SUPERFISH output files for the accelerator cavity field, MAFIA output files for the 3-D perturbation fields due to the coupling slots in the accelerator cells, and POISSON output files for the solenoid field in the gun region. The results from simulations are, at 2.3 nC, a peak current of 180 A and a 90 percent emittance of 9.4 (pi) mm-mmrad. The exit energy from the linac is 20 MeV for both cases. A magnetic pulse compressor can be used to further increase the peak current. DOE

N92-12263# Los Alamos National Lab., NM.
EVEN HARMONIC LASING
M. J. Schmitt 1991 12 p Presented at the 13th International Free-Electron Laser (FEL) Conference, Santa Fe, NM, 25-30 Aug. 1991
(Contract W-7405-eng-36)
(DE92-000207; LA-UR-91-3013; CONF-9108118-3) Avail: NTIS HC/MF A03

Operation of a free-electron laser at harmonics of the fundamental frequency is explored with the numerical simulation code HELEX. This code includes coupling to the harmonics caused by misalignment of the electrons with the optical beam and coupling due to transverse gradients. Albeit weak, the transverse gradients produce the dominant coupling of the electrons to the even-harmonic light. Even-harmonic lasing occurs in a TEM(sub 0,2m+1)-like mode where the field on axis is zero. As bunching of the electron beam progresses, radiation at the higher odd harmonics is suppressed owing to the absence of higher-order odd-harmonic Fourier components in the bunch. Growth of the even-harmonic power from small signal requires suppression of competing harmonics (including the fundamental) that have higher gain. Lasing at an even harmonic has yet to be experimentally demonstrated in an open resonator (i.e., optical cavity). Strategies to make such an experiment possible are discussed. DOE

37 MECHANICAL ENGINEERING

Includes auxiliary systems (nonpower); machine elements and processes; and mechanical equipment.

N92-12264# Sandia National Labs., Albuquerque, NM.
MONOCULAR 3D VISION FOR A ROBOT ASSEMBLY ENVIRONMENT
L. P. Ray 1990 11 p Presented at the IEEE International Conference on Systems Engineering, Cincinnati, OH, Aug. 1990
(Contract DE-AC04-76DP-00789)
(DE90-010824; SAND-90-1272C; CONF-900894-1) Avail: NTIS HC/MF A03

The three-dimensional position and orientation of objects is estimated from one or more monocular images. The identities of the objects are known, and geometric models are assumed to be available. Images are interpreted, finding correspondence between linear features extracted from sensor data and modeled object features, by searching an interpretation tree built using prior position estimates. Object positions are updated by maximum-likelihood estimation. Position estimation results from an implemented system are presented, demonstrating location of partially occluded objects in a cluttered scene. DOE

N92-12265# Oak Ridge National Lab., TN.
STIFFNESS CONTROL OF TELEOPERATORS WITH REDUNDANT, DISSIMILAR KINEMATICS
J. F. Jansen, R. Kress, S. Babcock, and W. Hamel 1990 5 p Presented at the IEEE International Conference on System Engineering, Pittsburgh, PA, 9-11 Aug. 1990
(Contract DE-AC05-84OR-21400)
(DE90-011642; CONF-9008103-1) Avail: NTIS HC/MF A01

This paper addresses the problem of dissimilar kinematic teleoperator systems. Since the next generation of teleoperator systems will likely include dissimilar kinematics, a workable control scheme compatible with modern microprocessor computing capability is needed. The control scheme presented in this paper incorporates the work and ideas of numerous researchers over the past 40 years. Due to the ongoing nature of this research and limited space allowed, only a brief summary will be given concerning the overall control strategy; instead, the master controller and orientation representation for both the master and slave will be the main focus of this paper. DOE

N92-12266# Sandia National Labs., Albuquerque, NM.
INTEGRATION OF MODEL-BASED AND SENSOR-BASED CONTROL FOR A TWO-LINK FLEXIBLE ROBOT ARM
J. T. Feddema, G. R. Eisler, and D. J. Segalman 1990 6 p Presented at the IEEE International Conference on Systems Engineering, Cincinnati, OH, Aug. 1990
(Contract DE-AC04-76DP-00789)
(DE90-012183; SAND-90-1292C; CONF-900894-2) Avail: NTIS HC/MF A02

This paper analyzes the experimental results of model-based and sensor-based control strategies for a two-link flexible, planar, robot arm. An off-line optimization determines a minimum time, straight line tip trajectory which stays within the torque constraints of the motors and ends in a quiescent state, i.e., no vibrational transients. An efficient finite-element model is used in the optimization to approximate the flexible arm dynamics. Control schemes tested include an open loop torque profile, a closed loop Proportional-Derivative (PD) joint controller, and a feedforward controller. This last scheme uses the torque profile created from the optimization, along with PD feedback of the joint angles and proportional feedback of the strain gages, to correct for errors in the model. The results show that the best performance is achieved with this feedforward approach. DOE

N92-12267# Sandia National Labs., Albuquerque, NM.
A VIRTUAL SENSOR APPROACH TO ROBOT KINEMATIC IDENTIFICATION: THEORY AND EXPERIMENTAL IMPLEMENTATION
P. F. Muir 1990 17 p Presented at the IEEE International Conference on System Engineering, Pittsburgh, PA, 9-11 Aug. 1990
(Contract DE-AC04-76DP-00789)
(DE90-012186; SAND-90-0236C; CONF-9008103-2) Avail: NTIS HC/MF A03

Kinematic parameter estimates are required for the implementation of robot servo-control algorithms. The goal of robot kinematic identification is to accurately estimate robot kinematic parameters from experimental data. A system for identifying robot kinematics is developed which applies a novel virtual sensor approach to parameter estimation. The system incorporates the uncertainty of experimental measurements through the introduction of computationally simple variance matrix approximations. A novel line-fitting procedure which requires no additional sensors or accurately machined components is devised for experimentally comparing the parameter estimates with the robot design parameters. Experimental data is acquire from and the kinematic parameters are estimated for an Adept II robot manipulator using a commercially available visual three-dimensional position sensor. DOE

N92-12268# Oak Ridge National Lab., TN.
AUTONOMOUS TRAJECTORY GENERATION FOR MOBILE ROBOTS WITH NON-HOLONOMIC AND STEERING ANGLE CONSTRAINTS
F. G. Pin and H. A. Vasseur 1990 6 p Presented at the IEEE International Workshop on Intelligent Motion Control, Istanbul, Turkey, 20-22 Aug. 1990
(Contract DE-AC05-84OR-21400)
(DE90-012298; CONF-9008122-1) Avail: NTIS HC/MF A02

This paper presents an approach to the trajectory planning of mobile platforms characterized by non-holonomic constraints and constraints on the steering angle and steering angle rate. The approach is based on geometric reasoning and provides deterministic trajectories for all pairs of initial and final configurations (position x, y, and orientation, theta) of the robot. Furthermore, the method generates trajectories taking into account the forward and reverse mode of motion of the vehicle, or combination of these when complex maneuvering is involved or when the environment is obstructed with obstacles. The trajectory planning algorithm is described, and examples of trajectories generated for a variety of environmental conditions are presented. The generation of the trajectories only takes a few milliseconds of run time on a micro-Vax, making the approach quite attractive for use as a real-time motion planner for teleoperated or sensor-based autonomous vehicles in complex environments.
DOE

N92-12269*# Alabama Univ., Huntsville. Materials Processing Lab.
WELDING IN SPACE WORKSHOP Final Report
Gary L. Workman 1 Mar. 1990 85 p Workshop held in Huntsville, AL, 8-9 Nov. 1989
(Contract NAS8-36955)
(NASA-CR-184234; NAS 1.26:184234) Avail: NTIS HC/MF A05 CSCL 13H

The potential was discussed for welding in space, its advantages and disadvantages, and what type of programs can benefit from the capability. Review of the various presentations and comments made in the course of the workshop suggests several routes to obtaining a better understanding of how welding processes can be used in NASA's initiatives in space. They are as follows: (1) development of a document identifying well processes and equipment requirements applicable to space and lunar environments; (2) more demonstrations of welding particular hardware which are to be used in the above environments, especially for space repair operations; (3) increased awareness among contractors responsible for building space equipment as to the potential for welding operations in space and on other planetary bodies; and (4) continuation of space welding research projects is important to maintain awareness within NASA that welding in space is viable and beneficial.
Author

N92-12270 Council for National Academic Awards (England).
VARIABLE IMPEDANCE JOURNAL BEARINGS FOR ROTOR-BEARING SYSTEMS Ph.D. Thesis
Tirdad Boroomand 1990 232 p
Avail: Univ. Microfilms Order No. BRDX92789

The oil film in hydrodynamic journal bearings, coupled with the flexibility of the bearing foundation, introduces a significant amount of flexibility into the overall support system of rotating machines, with the consequence of reducing the machine's critical speeds to below those calculated on the basis of pinned supports. Prediction of machine critical speeds and vibration levels is often difficult due to imprecise values for oil film and foundation dynamic stiffness. The aim of this thesis was to develop a new hydrodynamic journal bearing whose dynamic stiffness could be tuned, without upsetting the bearing steady load carrying capacity, in order to shift critical speeds away from the machine normal running speed, and reduce vibration at the critical speeds to a minimum. A theoretical analysis of the bearing design was carried out, based on a finite difference model of the bearing oil film. This analysis enabled the steady state load carrying capacity of the bearing to be calculated for any particular running conditions. The oil film stiffness and damping characteristics were than calculated using the finite displacement technique; these were then used to calculate the unbalance response of a flexible rotor running in such bearings. Experimental measurements of the unbalance response of a model rotor running in the new bearing design were also recorded, and compared with similar measurements obtained when conventional bearings were used. Both theoretical and experimental results show that the proposed new bearing design has a similar steady load carrying capacity to that of conventional hydrodynamic bearings, but that the unbalance response and force transmissibility of machines running in the new bearing design are substantially superior to those obtained with conventional bearings.
Dissert. Abstr.

N92-12271 West Virginia Univ., Morgantown.
THREE-DIMENSIONAL ELASTODYNAMIC MODELING AND ANALYSIS OF A FLEXIBLE ROBOT MANIPULATOR Ph.D. Thesis
Ching-I. Chen 1990 318 p
Avail: Univ. Microfilms Order No. DA9121855

This research focuses on the elastodynamic modeling and analysis of a flexible robot manipulator system. The aim of this research is towards the development of an alternate approach to derive and solve the overall elastodynamic equations of motion of a general open loop three dimensional flexible robot manipulator system. A general mathematical model of a moving flexible beam attached to a flexible moving body is set up in spatial dimensions. This model is obtained by means of a continuous functional approach and is used to derive the general equation for elastic deformation. The Timoshenko beam assumption and the effect of axial force in the bending vibration are adopted in the general mathematical model. However, the simpler Euler Bernoulli beam assumption is used in the actual application for the robot manipulator system. These equations of motion are highly nonlinear, second order, coupled differential equations with nonhomogeneous boundary conditions. The driving torque equations can be divided by the traditional Newton Euler formulation which is computationally efficient. The completeness and uniqueness of the research resides in the combination of these two procedures to yield an approach called here the Lagrange Newton Euler (L-N-E) formulation. The modal synthesis and Galerkin methods are applied to render the resulting system of equations to a set of time dependent coefficients of second order differential equations in the time domain. This set of equations can be solved in the time domain using the Runge Kutta fourth order integration method or the Newmark scheme. The time response of the system based on these equations of motion is obtained yielding the elastic deformations. Furthermore, the joint forces and driving torques can be obtained as the elastic deformations are derived. Seven different robot manipulator systems will be analyzed. The overall dynamic analytical solutions in this research are compared and are identical with those developed by Lagrange formulation. A numerical comparison of one link manipulator system is implemented with existing documents.
Dissert. Abstr.

N92-12272 Carnegie-Mellon Univ., Pittsburgh, PA.
HEURISTIC METHODS FOR OPTIMAL TRAJECTORY PLANNING OF ROBOTIC MANIPULATORS Ph.D. Thesis
Lyman J. Petrosky 1991 107 p
Avail: Univ. Microfilms Order No. DA9123512

The problem is addressed of planning globally optimal trajectories for unconstrained point to point motions of robotic manipulators that are dominated by inertial effects such as space based manipulators. The solution methods presented use the global mathematical structure of the inertial system unlike existing solution methods that evaluate only local effects. The equations governing behavior of inertial systems in general, and robot manipulators in particular, are formulated in terms of a Riemannian manifold which is a purely geometric entity. This inertia manifold describes the geometric basis underlying motions in nonlinear coupled dynamic systems. Two methods were developed that use the geometric structure of the manipulator inertia manifold to locate the global

minimum geodesic path and then generate from it a trajectory that is expected to lie in the neighborhood of the global optimal solution. This initial trajectory is then refined by interative methods. The two methods are considered heuristic because they cannot guarantee that the resulting solution is the global optimal solution, but they do assure that the iterative solution process begins in the expected neighborhood of the global optimal solution.

Dissert. Abstr.

N92-12273*# Scientific Research Associates, Inc., Glastonbury, CT.

VELOCITY AND PRESSURE CHARACTERISTICS OF A MODEL SSME HIGH PRESSURE FUEL TURBOPUMP Final Report

D. G-N. Tse, J. S. Sabnis, and H. McDonald Mar. 1991 108 p (Contract NAS8-36186)

(NASA-CR-184239; NAS 1.26:184239; R91-900065-F) Avail: NTIS HC/MF A06 CSCL 13K

Under the present effort an experiment rig has been constructed, an instrumentation package developed and a series of mean and rms velocity and pressure measurements made in a turbopump which modelled the first stage of the Space Shuttle Main Engine (SSME) High Pressure Fuel Turbopump. The rig was designed so as to allow initial experiments with a single configuration consisting of a bell-mouth inlet, a flight impeller, a vaneless diffuser and a volute. Allowance was made for components such as inlet guide vanes, exit guide vanes, downstream pumps, etc. to be added in future experiments. This flexibility will provide a clear baseline set of experiments and allow evaluation in later experiments of the effect of adding specific components upon the pump performance properties. The rotational speed of the impeller was varied between 4260 and 7680 rpm which covered the range of scaled SSME rotation speeds when due allowance is made for the differing stagnation temperature, model to full scale. The results at the inlet obtained with rotational speeds of 4260, 6084 and 7680 rpm showed that the axial velocity at the bell-mouth inlet remained roughly constant at 2.2 of the bulk velocity at the exit of the turbopump near the center of the inlet, but it decreased rapidly with increasing radius at all three speeds. Reverse flow occurred at a radius greater than 0.9 R for all three speeds and the maximum negative velocity reduced from 1.3 of the bulk velocity at the exit of the turbopump at 4260 rpm to 0.35 at 7680 rpm, suggesting that operating at a speed closer to the design condition of 8700 rpm improved the inlet characteristics. The reverse flow caused positive prerotation at the impeller inlet which was negligibly small near the center but reached 0.7 of the impeller speed at the outer annulus. The results in the diffuser and the volute obtained at 7680 rpm show that the hub and shroud walls of the diffuser were characterized by regions of transient reverse flow with negative revolution-averaged velocity of 8 percent of the maximum forward revolution-averaged velocity at the center of the diffuser passage near the shroud wall.

Author

N92-12274*# Carnegie-Mellon Univ., Pittsburgh, PA. Dept. of Mechanical Engineering.

A UNIFIED MOTION PLANNING APPROACH FOR REDUNDANT AND NON-REDUNDANT MANIPULATORS WITH ACTUATOR CONSTRAINTS Ph.D. Thesis Final Report

Ching-Luan Chung Dec. 1990 118 p Previously announced as N91-32494

(Grant NAG3-811)

(NASA-CR-189002; NAS 1.26:189002) Copyright Avail: NTIS HC/MF A06 CSCL 13I

The term trajectory planning has been used to refer to the process of determining the time history of joint trajectory of each joint variable corresponding to a specified trajectory of the end effector. The trajectory planning problem was solved as a purely kinematic problem. The drawback is that there is no guarantee that the actuators can deliver the effort necessary to track the planned trajectory. To overcome this limitation, a motion planning approach which addresses the kinematics, dynamics, and feedback control of a manipulator in a unified framework was developed. Actuator constraints are taken into account explicitly and a priori in the synthesis of the feedback control law. Therefore the result of applying the motion planning approach described is not only the determination of the entire set of joint trajectories but also a complete specification of the feedback control strategy which would yield these joint trajectories without violating actuator constraints. The effectiveness of the unified motion planning approach is demonstrated on two problems which are of practical interest in manipulator robotics.

Author

N92-12275# Lawrence Livermore National Lab., CA.

ON THE FORMATION OF A JOINT DURING COLD WELDING

B. V. Meriin 29 Apr. 1991 10 p Transl. into ENGLISH of from Fizika i Kkhimiya Obrabotki Materialov (USSR), no. 6, 1968 p 125-129

(Contract W-7405-eng-48)

(DE91-017672; UCRL-TT-107146) Avail: NTIS HC/MF A02

Materials from an experimental study of the process of formation of a workable joint during cold welding are given. An interpretation of the experiment results are presented. It is very useful to study the processes of formation of a joint during cold welding on the example of a butt joint. Butt welding makes it possible to obtain joints in a wide range of deformations (the basic technological parameter of cold welding). The previously developed technique of mechanical testing of butt joints assures the joint will fail through the zone of the butt, which makes it possible to evaluate the strength and plasticity of the metal of the weld zone, to identify welding defects, and to analyze the fractures. The tests were carried out on samples of AMts aluminum alloy (phi)20 mm, copper (phi)16 mm, and copper with aluminum (phi)20 mm, which were butt welded on an MSKhS-80 machine. Clamp jaws with sharpened end surfaces, which cut the metal forced out into a flash, were used. Welding was done in lots in regimes with increasing deformation, which was determined by the relative throat, h/d where h is the size of the deformable throat and d is the diameter of the sample being welded. DOE

N92-12276*# Carnegie-Mellon Univ., Pittsburgh, PA. Dept. of Mechanical Engineering.

A UNIFIED MOTION PLANNING APPROACH FOR REDUNDANT AND NON-REDUNDANT MANIPULATORS WITH ACTUATOR CONSTRAINTS Ph.D. Thesis Final Report

Ching Luan Chung Dec. 1990 119 p

(Grant NAG3-811)

(NASA-CR-189023; NAS 1.26:189023) Copyright Avail: NTIS HC/MF A06 CSCL 13I

A motion planning approach which addresses the kinematics, dynamics, and feedback control of a manipulator in a unified framework was developed. Actuator constraints are taken into account explicitly and a priori in the synthesis of the feedback control law. Therefore the result of applying the motion planning approach described is not only the determination of the entire set of joint trajectories but also a complete specification of the feedback control strategy which would yield these joint trajectories without violating actuator constraints. The effectiveness of the unified motion planning approach is demonstrated on two problems which are of practical interest in manipulator robotics. Author

N92-12277# Technische Univ., Berlin (Germany, F.R.). Inst. fuer Luft- und Raumfahrt.

SELECTED METHODS FOR THE INVESTIGATION OF LINEAR, CONTINUOUS AND DISCRETE-CONTINUOUS MECHANICAL MODELS OF A RAIL

Zygmunt Strzyzakowski (Technical Univ. of Warsaw, Poland) Mar. 1991 141 p

(ILR-Mitt-261(1991); ETN-91-90207) Avail: NTIS HC/MF A07

Dynamics of mechanical vehicle track systems are considered paying attention to the models of a vehicle and track as discrete, continuous and discrete continuous systems. Methods of investigating these models are presented. Dynamic properties of simple linear discrete systems are considered and methods to compare dynamic properties of continuous and discrete systems are presented. For this reason the continuous track structure is assumed as a Bernoulli-Euler beam on Winkler foundation.

Analytical solutions for continuous track models are presented. The track is modeled as a Bernoulli-Euler beam or a Timoshenko beam on Winkler foundation loaded with a harmonically oscillating force moving at a constant speed. Selected methods to investigate continuous and discrete continuous systems are presented. As mathematical models, the Fourier method of separation of variables applied to continuous finite systems and the Fourier integral method applied to a case of continuous infinite systems are used. ESA

N92-12278*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
PLANNING AND REASONING IN THE JPL TELEROBOT TESTBED
Stephen Peters, David Mittman, Carol Collins, Jacquie OMeara, and Mark Rokey 15 Sep. 1990 73 p
(Contract NAS7-918)
(NASA-CR-189038; IPL-Publ-90-37; NAS 1.26:189038) Avail: NTIS HC/MF A04 CSCL 13I

The Telerobot Interactive Planning System is developed to serve as the highest autonomous-control level of the Telerobot Testbed. A recent prototype is described which integrates an operator interface for supervisory control, a task planner supporting disassembly and re-assembly operations, and a spatial planner for collision-free manipulator motion through the workspace. Each of these components is described in detail. Descriptions of the technical problem, approach, and lessons learned are included. Author

N92-12279*# Alabama Univ., Huntsville.
THE VARIABLE POLARITY PLASMA ARC WELDING PROCESS: CHARACTERISTICS AND PERFORMANCE Final Report, 9 Jun. 1990 - 8 Jun. 1991
R. J. Hung and G. J. Zhu Jun. 1991 75 p
(Contract NAS8-36955)
(NASA-CR-184259; NAS 1.26:184259) Avail: NTIS HC/MF A04 CSCL 13H

Significant advantages of the Variable Polarity Plasma Arc (VPPA) Welding Process include faster welding, fewer repairs, less joint preparation, reduced weldment distortion, and absence of porosity. The power distribution was analyzed for an argon plasma gas flow constituting the fluid in the VPPA Welding Process. The major heat loss at the torch nozzle is convective heat transfer; in the space between the outlet of the nozzle and the workpiece; radiative heat transfer; and in the keyhole in the workpiece, convective heat transfer. The power absorbed at the workpiece produces the molten puddle that solidifies into the weld bead. Crown and root widths, and crown and root heights of the weld bead are predicted. The basis is provided for an algorithm for automatic control of VPPA welding machine parameters to obtain desired weld bead dimensions. Author

N92-12280# Argonne National Lab., IL.
COMPUTATION OF MAGNETIC SUSPENSION OF MAGLEV SYSTEMS USING DYNAMIC CIRCUIT THEORY
J. L. He, D. M. Rote, and H. T. Coffey 1991 19 p Presented at the International Symposium on Magnetic Suspension Technology, Hampton, VA, 19-23 Aug. 1991
(Contract W-31-109-eng-38)
(DE91-017973; ANL/CP-72983; CONF-910882-1) Avail: NTIS HC/MF A03

Dynamic circuit theory is applied to several magnetic suspensions associated with maglev systems. These suspension systems are the loop-shaped coil guideway, the figure-eight-shaped null-flux coil guideway, and the continuous sheet guideway. Mathematical models, which can be used for the development of computer codes, are provided for each of these suspension systems. The differences and similarities of the models in using dynamic circuit theory are discussed in the paper. The paper emphasizes the transient and dynamic analysis and computer simulation of maglev systems. In general, the method discussed here can be applied to many electrodynamic suspension system design concepts. It is also suited for the computation of the performance of maglev propulsion systems. Numerical examples are presented in the paper. DOE

N92-12281# Sandia National Labs., Albuquerque, NM.
DETERMINATION OF THE CONTACT FORCES BETWEEN A PROJECTILE AND A HARD TARGET
R. K. Thomas, V. I. Bateman, and T. G. Carne 1991 9 p Presented at the Army Symposium on Solid Mechanics: Synergism of Mechanics, Mathematics, and Materials, Plymouth, MA, 4-7 Nov. 1991
(Contract DE-AC04-76DP-00789)
(DE91-018354; SAND-91-0364C; CONF-911195-1) Avail: NTIS HC/MF A02

The determination of the contact forces at impact between a deformable projectile and a hard target is required for the design of energy absorbing features which limit shock loads experienced by critical onboard components carried by the projectile. In this paper we present both analytical and experimental methods to obtain the force-displacement history of the impact event. The immediate application of these methods is toward the design of energy absorbing noses for laydown bombs. Upon impact, the desired performance of the deformable nose is to absorb the kinetic energy of the laydown bomb and smoothly decelerate the motion to near-zero velocity. This attenuates the shock loads to internal electronic components which must function after the impact event. The example we have chosen is the axial impact of a 670 lb projectile, traveling at a velocity of 125 ft/sec, onto a hard concrete target. In general, this technology falls within the area of crash worthiness, and thus has further application to transportation vehicles and shipping containers. DOE

N92-12282# Comision Nacional de Energia Atomica, Buenos Aires (Argentina). Dept. de Materiales.
FAILURE ANALYSIS OF TURBINE BLADES [ANALISIS DE FALLAS DE ALABES DE TURBINAS]
A. F. Iorio and J. C. Crespi 1989 30 p In SPANISH
(DE91-631513; CNEA-NT-2/89) Avail: NTIS HC/MF A03

Two 20 MW gas turbines suffered damage in blades belonging to the 2nd stage of the turbine after 24,000 hours of duty. From research it arises that the fuel used is not quite adequate to guarantee the blade's operating life due to the excess of SO3, C and Na existing in combustion gases which cause pitting to the former. Later, the corrosion phenomenon is presented under tension produced by working stress enhanced by pitting where Pb is its main agent. A change of fuel is recommended thus considering the blades will reach the operational life they were designed for. DOE

N92-12283# Oak Ridge National Lab., TN.
COMPUTER MODELING OF ARC WELDS TO PREDICT EFFECTS OF CRITICAL VARIABLES ON WELD PENETRATION
T. Zacharia and S. A. David 1991 18 p Presented at the 7th Annual North American Welding Research (NAWR) Conference, Columbus, OH, 2-4 Oct. 1991
(Contract DE-AC05-84OR-21400)
(DE92-000428; CONF-9110226-1) Avail: NTIS HC/MF A03

In recent years, there have been several attempts to study the effect of critical variables on welding by computational modeling. It is widely recognized that temperature distributions and weld pool shapes are keys to quality weldments. It would be very useful to obtain relevant information about the thermal cycle experienced by the weld metal, the size and shape of the weld pool, and the local solidification rates, temperature distributions in the heat-affected zone (HAZ), and associated phase transformations. The solution of moving boundary problems, such as weld pool fluid flow and heat transfer, that involve melting and/or solidification is inherently difficult because the location of the solid-liquid interface is not known a priori and must be obtained as a part of the solution. Because of non-linearity of the governing equations, exact analytical solutions can be obtained only for a limited number of idealized cases. Therefore, considerable interest has been directed toward the use of numerical methods to obtain time-dependant

solutions for theoretical models that describe the welding process. Numerical methods can be employed to predict the transient development of the weld pool as an integral part of the overall heat transfer conditions. The structure of the model allows each phenomenon to be addressed individually, thereby gaining more insight into their competing interactions. DOE

N92-12284# Oak Ridge National Lab., TN. Metals and Ceramics Div.
MATERIAL AND LUBRICANT RELATIONSHIPS IN THE TRIBOLOGY OF INTERNAL COMBUSTION ENGINES
C. S. Yust 1991 15 p Presented at the 4th International Symposium on Ceramic Materials and Components for Engines, Goeteborg, Sweden, 10-12 Jun. 1991
(Contract DE-AC05-84OR-21400)
(DE92-000674; CONF-910617-5) Avail: NTIS HC/MF A03

Ceramics are being introduced into production engines for both wear resistance and inertial response, as well as for thermal barrier and elevated temperature capability. The selection of both materials and lubricants for future generations of engines will be influenced by the demands for efficient, environmentally sound, and minimally serviced but long-lived operation. The long-term tribological response of the selected materials is a significant issue which does not generally receive sufficient attention. An experimental approach to the evaluation of the long-term response of engine candidate ceramics, based on an earlier wear mode transition diagram, is discussed in this paper. Data are presented for initial studies of a silicon carbide whisker-silicon nitride composite. DOE

38 QUALITY ASSURANCE AND RELIABILITY

Includes product sampling procedures and techniques; and quality control.

N92-12285 Colorado Univ., Boulder.
WAVE PROPAGATION AND SCATTERING IN LAYERED MEDIA: APPLICATION TO ULTRASONIC NONDESTRUCTIVE EVALUATION OF INTERFACIAL CRACKS AND EARTHQUAKE GROUND MOTION Ph.D. Thesis
Mounir Bouden 1990 222 p
Avail: Univ. Microfilms Order No. DA9117030

The scattering was studied of elastic waves by a cylindrical scatterer embedded in a layered medium. A hybrid numerical method was used as a solution technique. A small region (interior) around the scatterer bounded by a fictitious contour B is discretized with finite elements yielding a linear system of equations relating the inside nodal displacements to the boundary ones. The region exterior to B is represented by Green's function boundary integral representation derived from the elastodynamic reciprocity theorem. By imposing the continuity of displacements and tractions at the boundary nodal points, the displacements at these nodes are obtained. Then, the displacements at the interior nodes are calculated from the finite element equations. First, the method is used to show the effect of localized topographical and geological irregularities on the ground motion amplification. Second, the same method with a slight change is applied to study the dynamic response of a layered half-space with interfacial cracks due to in-plane surface line loadings. Numerical results for single and double cracks are presented for crack opening displacements, dynamic stress intensity factors, and surface displacements. Dissert. Abstr.

N92-12286*# National Aeronautics and Space Administration, Washington, DC.
NASA RELIABILITY PREFERRED PRACTICES FOR DESIGN AND TEST
Sep. 1991 98 p
(NASA-TM-4322; NAS 1.15:4322) Avail: NTIS HC/MF A05 CSCL 14D

Given here is a manual that was produced to communicate within the aerospace community design practices that have contributed to NASA mission success. The information represents the best technical advice that NASA has to offer on reliability design and test practices. Topics covered include reliability practices, including design criteria, test procedures, and analytical techniques that have been applied to previous space flight programs; and reliability guidelines, including techniques currently applied to space flight projects, where sufficient information exists to certify that the technique will contribute to mission success. Author

N92-12287# Wisconsin Univ., Madison.
LIFE TESTING AND RELIABILITY WITH APPLICATION IN ENGINEERING SYSTEMS Final Report, 15 Jun. 1987 - 14 Oct. 1990
Richard A. Johnson and Gouri K. Bhattacharyya 14 Oct. 1990 6 p
(Grant AF-AFOSR-0256-87; AF Proj. 2304)
(AD-A240042; AFOSR-91-0720TR) Avail: NTIS HC/MF A02 CSCL 12/3

Current research is concentrated in several areas of life testing and reliability which are theoretically challenging as well as directly motivated from potential practical applications to engineering systems. Particular emphasis was placed on the development of procedures that are appropriate for costly experiments involving small sample sizes. GRA

N92-12288# National Research Council of Canada, Ottawa (Ontario). Structures and Materials Lab.
GENERAL INTRODUCTION TO ENGINEERING FAILURE ANALYSIS
W. Wallace 19 Jun. 1990 36 p Presented at the Short Course on Failure Analysis, Doha, Qatar, Oct. 1990
(NAE Proj. 07344)
(NRC-LTR-ST-1773; CTN-91-60223) Copyright Avail: NTIS HC/MF A03

This report describes the importance of failure analysis as a discrete branch of engineering science as a basis for the retroactive design of engineering components. The general approach to failure analysis is described in terms of the collection and use of all available design data, as well as information on the operating environment. The principal diagnostic tools used in failure analysis are described, including the use of visual inspection, stress analysis, optical and electron microscopy, fractography, x-ray diffraction and radiography, other nondestructive inspection techniques and mechanical testing. Examples are provided of the failure analysis of engineering components, including: (1) overload followed by plastic deformation, (2) overload followed by brittle fracture, (3) overload and brittle fracture due to quenching induced stresses, (4) fatigue failure of an aircraft propeller blade due to residual tensile stresses, and (5) brittle fracture of a developmental powder fabricated turbine disc due to inadequate control of the manufacturing process. Development of a thorough understanding of the materials employed and the way they respond to manufacturing processes and service operating conditions are extremely important. Apparently minor changes in operating conditions can result in dramatic changes in the way materials respond and may completely invalidate the original design assumptions. Author (CISTI)

N92-12289# National Research Council of Canada, Ottawa (Ontario). Structues and Materials Lab..
ACOUSTO-ULTRASONICS FOR ADHESIVE BOND EVALUATION
A. Fahr, Y. Youssef, C. Roy, and S. Tanary (Ottawa Univ. Ontario) 25 Sep. 1990 17 p Sponsored in part by Defence Research Establishment Pacific and Dept. of National Defence
(NRC-LTR-ST-1799; CTN-91-60245) Copyright Avail: NTIS HC/MF A03

The structural use of adhesively bonded joints, particularly in aerospace applications, requires the use of nondestructive evaluation (NDE) techniques for the characterization and qualification of bond integrity. However, the majority of NDE

methods currently used for adhesive bond inspection are only capable of detecting physical defects such as voids or total disbond and the detection of poor bond quality due to surface contamination or environmental degradation remains a problem. In this paper, experimental results from Acousto Ultrasonic (AU) measurements and pattern recognition analysis followed by destructive shear tests on single-lap joint specimens made from either metallic or carbon fiber composite adherends and commercial adhesives with different types of bond line defects are presented. The results indicate that it is possible to separate samples with contaminated surfaces and degraded adhesives from well-bonded specimens with excellent recognition rates. Also, good correlations were found between the stress wave propagation characteristics and the shear strength of the bonded joint. Author (CISTI)

N92-12290# National Research Council of Canada, Boucherville (Quebec). Industrial Materials Research Inst.
DESIGN OF A LONG ISOTROPIC BUFFER ROD
C. K. Jen, L. Piche, and J. F. Bussiere 1988 19 p
(NRC-28903; CTN-91-60279) Copyright Avail: NTIS HC/MF A03

Ultrasonic pulse-echo techniques are widely used for nondestructive evaluation of materials. In particular, they are used to measure elastic properties and in the detection of discrete defects. The use of buffer rods is sometimes necessary to avoid exposing the instrument's transducers to extreme test conditions. Considerations for the design of long isotropic buffer rods are presented. The buffer rods of interest have diameters between a few to several tens of acoustic wavelengths, and lengths of more than a hundred acoustic wavelengths. Longitudinal and shear wave measurements obtained on aluminum rods with an ultrasonic pulse-echo system are presented and interpreted theoretically in terms of diffraction from the transducer and mode conversion at the walls of the buffer rod. When longitudinal waves are propagated in cylindrical buffer rods, numerous trailing echoes are observed in addition to the first arrival echo. These trailing echoes are associated with mode conversion at the walls of the buffer rod. It is possible to eliminate these echoes by machining grooves along the walls of the rods, or more efficiently by using conical buffer rods. The behavior with shear waves is different because mode conversion does not occur. In this case, messy signals are associated with multiple reflections at the walls of the rod. Best results for shear waves are obtained with rods of relatively large diameter. CISTI

N92-12291# Laval Univ. (Quebec). Dept. of Electrical Engineering.
INSPECTION OF MATERIALS AND STRUCTURES BY INFRARED THERMOGRAPHY: SIGNAL PROCESSING TECHNIQUES FOR DEFECT ENHANCEMENT AND CHARACTERIZATION
X. Maldague, D. Poussart, J. C. Krapez (National Research Council of Canada, Boucherville, Quebec), and P. Cielo 1990 26 p Sponsored by Tecrad, Inc.
(NRC-29717; NRC-IGM88AP-404-792-G; CTN-91-60295) Avail: NTIS HC/MF A03

Active infrared thermography is a nondestructive evaluation technique whereby heat perturbation is used to stimulate the thermal response of a given part. Appropriate signal processing techniques must be developed in order to detect subsurface defects or to obtain quantitative information from the raw data. Because of the limited heating temperatures (of the order of 10 C) and other diffusion-based propagation of thermal waves, the constrast of thermal features in a thermographic image is relatively low. Image proccessing must be based on blurred feature recognition rather than on the detection of edges and contours as is usually the case for video images. In this paper some recent developments on thermographic inspection at the Industrial Materials Research Institute (IMRI) are described. A substantial amount of effort has been devoted to image processing and thermal modelling as required for rapid image analysis, signal enhancement, and noise removal from the thermograph, as well as for a quantitative sizing of defects. Examples are presented concerning the inspection of graphite-epoxy structures and of aluminum bonded panels with foam or honeycomb core. Author (CISTI)

N92-12292*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
VIBROACOUSTIC PAYLOAD ENVIRONMENT PREDICTION SYSTEM (VAPEPS): VAPEPS MANAGEMENT CENTER REMOTE ACCESS GUIDE
J. P. Fernandez and D. Mills 15 Jun. 1991 52 p
(Contract NAS7-918)
(NASA-CR-189448; JPL-Publ-91-26; NAS 1.26:189448) Avail: NTIS HC/MF A04 CSCL 14D

A Vibroacoustic Payload Environment Prediction System (VAPEPS) Management Center was established at the JPL. The center utilizes the VAPEPS software package to manage a data base of Space Shuttle and expendable launch vehicle payload flight and ground test data. Remote terminal access over telephone lines to the computer system, where the program resides, was established to provide the payload community a convenient means of querying the global VAPEPS data base. This guide describes the functions of the VAPEPS Management Center and contains instructions for utilizing the resources of the center. Author

N92-12293# Los Alamos National Lab., NM.
DETECTION OF STRUCTURAL DEGRADATION
E. G. Endebrock 1991 9 p Presented at the 3rd International Machinery Monitoring and Diagnostic Conference, Las Vegas, NV, 9-12 Dec. 1991
(Contract W-7405-eng-36)
(DE91-016040; LA-UR-91-2284; CONF-911241-1) Avail: NTIS HC/MF A02

A time domain method developed for determining dynamic system characteristics is applied to structural monitoring and/or flaw detection. The potential usefulness for monitoring is evaluated based on several criteria, which include sensitivity to structural changes, location of flaws, and dependence upon excitation signals. The strengths and weaknesses of the methods are discussed. Also, structural monitoring using a signal's singular values is presented and evaluated. DOE

N92-12294# Sandia National Labs., Albuquerque, NM.
NEUTRON INTERACTIONS AND CONTRAST PRODUCTION IN NEUTRON RADIOGRAPHY
F. M. McCrory 1991 8 p Presented at the Fall Conference and 50th Anniversary Conference of the American Society for Nondestructive Testing, Boston, MA, 15-18 Sep. 1991
(Contract DE-AC04-76DP-00789)
(DE91-019064; SAND-91-2113C; CONF-910952-1) Avail: NTIS HC/MF A02

The usefulness of neutron radiography as a nondestructive engineering tool is heavily dependent on how a neutron reaches the image plane. Neutron interactions such as scattering and absorption, within a neutron radiography facility or a test part, affect the contrast of the resulting image generated by the process. It is important that the radiographer has a general understanding of how neutrons interact with matter to produce a quality image utilizing a neutron beam. DOE

39 STRUCTURAL MECHANICS

Includes structural element design and weight analysis; fatigue; and thermal stress.

For applications see *05 Aircraft Design, Testing and Performance* and *18 Spacecraft Design, Testing and Performance.*

N92-12295# Los Alamos National Lab., NM.
ADAPTATION OF AN INDUSTRIAL APPLICATION FOR AN INSTRUCTIONAL LABORATORY IN MECHANICAL VIBRATIONS
W. E. Whiteman (Military Academy, West Point, NY.) 1990 4 p

Presented at the Meeting of the American Society for Engineering Education, Toronto (Canada), Jun. 1990
(Contract W-7405-eng-36)
(DE90-013692; LA-UR-90-2043; CONF-9006175-2) Avail: NTIS HC/MF A01

Extensive theoretical treatment is given to damping as the process of energy dissipation during mechanical vibration. The challenge in the classroom is to adequately convey this concept and extend it by teaching students practical applications in engineering analysis and design. Students are motivated by real-world problems; applying these types of problems with strong instructional classroom content significantly enhances the learning environment. This paper proposes the adaptation of an actual research project to a simple, yet innovative, mechanical vibrations laboratory. The adapted project involves an ongoing effort at the Los Alamos National Laboratory to investigate damping factors of various alloys used in military tank munitions. The kinetic-energy penetrators used in these tank rounds are cylindrical in shape and are a major class of weapons designed to defeat heavy armor. Unwanted transverse oscillations of these penetrators degrade the accuracy of the rounds and may lead to glancing blows off the target. DOE

N92-12296 Florida Univ., Gainesville.
A GENERAL NONLINEAR THEORY OF LARGE ELASTIC DEFORMATION OF LAYERED PLATES Ph.D. Thesis
Aref Nizar Altawam 1990 93 p
Avail: Univ. Microfilms Order No. DA9121572

Layered plates fall into several categories where the preliminary assumptions as well as the methods of analysis are different, thus leading to multitudinous specialized theories. Starting from the 3-D theory of nonlinear elasticity, and using a displacement approach, a general layered theory is developed. It has the advantage of producing a complete set of fundamental equations consistent with various stages of linearization in the general strain displacement relations. The present theory incorporates the effects of transverse shear and transverse normal strains as well as rotatory inertia, with different thickness, material densities, and material constants in each layer of the plate. Theoretical development of the mathematical form of the nonlinear equations of motion and the boundary conditions is presented for the case of three layered plate. In showing the generality of the theory, several theories available in the literatures are derived from the present as special cases. A numerical study was conducted to correlate the results of the linear theory with a simplified version of the present theory; and the effects of compressible layers on a multilayered plate instability are examined. Dissert. Abstr.

N92-12297 Colorado Univ., Boulder.
CONSTRAINT TREATMENT TECHNIQUES AND PARALLEL ALGORITHMS FOR MULTIBODY DYNAMIC ANALYSIS Ph.D. Thesis
Jin-Chern Chiou 1990 189 p
Avail: Univ. Microfilms Order No. DA9123437

Computational procedures for kinematic and dynamic analysis of 3-D multibody dynamic (MBD) systems are developed from the differential-algebraic equations (DAE's) viewpoint. Two robust and efficient constraint treatment techniques are developed. The computational issues for enhancing accuracy, stability, and programming modularity of the techniques are also addressed for MBD analysis. A two-stage staggered explicit-implicit numerical algorithm, that takes advantage of a partitioned solution procedure and a robust and parallelizable integration algorithm, is developed. To speed up the computational procedures, parallel implementation of the present constraint treatment techniques' two-stage staggard explicit-implicit numerical algorithm was efficiently performed. To this end, the DAE's and the constraint treatment techniques were transformed into arrowhead matrices to which a Schur complement form was derived. By fully exploiting the sparse matrix structural analysis techniques, a parallel preconditioned conjugate gradient numerical algorithm is used to solve the systems equations written in Schur complement form. To evaluate the computational procedures, a software testbed was designed and implemented in both sequential and parallel computers. This testbed was used to demonstrate the robustness and efficiency of the constraint treatment techniques, the accuracy of the two-stage staggered explicit-implicit numerical algorithm, and the speed up of the Schur-complement-based parallel preconditioned conjugate gradient algorithm on a parallel computer. Dissert. Abstr.

N92-12298 Sheffield Univ. (England).
ON THE FEASIBILITY OF NUMERICAL ANALYSIS OF LARGE CREEP PROBLEMS Ph.D. Thesis
Necati I. Bagdatlioglu 1983 113 p
Avail: Univ. Microfilms Order No. BRDX92407

The advent of large scale computers has made it possible for the finite element method to be used as a modern and powerful design tool in the solution of creep problems. However, it still remains uneconomical from the computational viewpoint to employ refined global models in obtaining the solution, thus necessitating an alternative strategy. Fundamental concepts of the creep phenomenon are discussed, including the application of the incremental theory of creep to finite elements. A two dimensional finite element creep program utilizing the initial strain method is verified using a sample problem against a known solution. A conventional three dimensional creep program is written to analyze complex bodies, the results comparing favorably with the known analytical solution. As the number of degrees of freedom is increased, the solution of creep problems is rendered extremely costly even in two dimensions. A nesting technique is therefore developed, in which the coarse, global and refined, local models are numerically coupled, thus reducing the size of the original problem and allowing a cost effective analysis to be executed. The results obtained from case studies utilizing nested models agree closely with complete global models at both elastic and creep levels. Pilot studies into the incompleteness of the finite element mesh have been undertaken, as this phenomenon leads to a progressive degradation of traction boundary values, thus incurring inaccurate results and thereby necessitating the use of an algorithm to ameliorate the situation. Dissert. Abstr.

N92-12299 Washington Univ., Seattle.
AN EXPERIMENTAL AND NUMERICAL STUDY OF DELAMINATION PROPAGATION AND ARREST IN COMPOSITE BEAMS AND PLATES WHEN SUBJECTED TO LOW-VELOCITY IMPACT Ph.D. Thesis
Hamid Razi 1991 163 p
Avail: Univ. Microfilms Order No. DA9124942

The growth of delamination due to the low velocity central impact on simply supported graphite epoxy laminate beams and plates was studied. The cross section of a laminate beam showed that delamination between separated plies in the opposite side of the impacted surface dominated damage model. The laminate beams showed unstable delamination propagation after delamination initiated in these specimens. Ultrasonic C scan and then cross sectioning of the impacted plates showed that (1) the delamination between the two plies is the dominant failure mode; (2) the major axes of delamination is parallel to one of the fibers; and (3) the precursor of delamination is a shear failure in the other plies. The quasistatic testing on beams and plate specimens showed a good correlation between the damage distribution in impacted, and specimens tested quasistatically. The double cantilever beam and end notch fixture test were used to determine modes I and II critical strain energy release rates (CSERR) of delamination. Both critical strain energy release rates are constant function of crack extension. The dynamic finite element analysis coupled with fracture mechanics was used to study the effects of loading rate on the CSERR. Dissert. Abstr.

N92-12300*# National Aeronautics and Space Administration. John F. Kennedy Space Center, Cocoa Beach, FL.
DETERMINATION OF THE EFFECTS OF WIND-INDUCED VIBRATION ON CYLINDRICAL BEAMS
E. A. Artusa Aug. 1991 295 p
(NASA-TM-103824; NAS 1.15:103824; KSC-DM-3538) Avail: NTIS HC/MF A13 CSCL 20K

The objective of the analysis was to determine the critical length to diameter ratio (L/Do) of a hollow, cylindrical beam subjected to wind-induced vibration. The sizes of beams ranged from 4 to 24 inches and were composed of ASTM grade A and grade B and American Petroleum Institute grade X42 steels. Calculations used maximum steady-state wind speeds of 130 mph associated with hurricane conditions possible at the Kennedy Space Center. The study examined the effect that different end support and load conditions have on the natural frequencies of the beams. Finally, methods of changing the frequency of the wind-induced vibration were examined. The conclusions drawn were that the greatest possible L/Do is achieved using welded supports and limiting the maximum applied axial and bending loads to less than 50 percent. Author

N92-12301 ESDU International Ltd., London (England).
METHODS FOR IMPROVING DAMPING. PART 1: AN INTRODUCTION AND GUIDE TO PRACTICAL METHODS OF INCREASING STRUCTURAL DAMPING
Aug. 1991 35 p
(ESDU-91012-Pt-1; ISBN-0-85679-774-X; ISSN-0141-3961) Avail: ESDU

ESDU 91012 is particularly applicable to lightly damped structures typical of those used in aerospace. The principal sources of damping (acoustic, material and structural) are discussed and typical values of damping ratio likely to be met in various types of metallic and composite structures without special treatment are suggested. The properties of materials used to provide additional damping are reviewed, with particular consideration given to temperature and frequency effects. Factors to be considered in practice when excessive noise or vibration are to be alleviated are discussed. Methods of increasing damping in structural design (metallic or composite) are considered and the addition of damping by layered treatments or a tuned damper is discussed. Analytical methods for estimating the damping provided by added free layers of damping material applied symmetrically or asymmetrically to beams and plates are given, together with methods for estimating the damping due to constrained layers of damping material also applied to beams and plates. Good practice in the use of the layered treatments and tuned dampers is discussed and illustrated in particular cases. ESDU

N92-12302*# National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.
METHOD OF RECERTIFYING A LOADED BEARING MEMBER Patent Application
Sidney G. Allison, inventor (to NASA) 19 Jun. 1991 25 p
(NASA-Case-LAR-14168-1; NAS 1.71:LAR-14168-1; US-Patent-Appl-SN-717755) Avail: NTIS HC/MF A03 CSCL 20K

A method is described of recertifying a loaded bearing member using ultrasound testing to compensate for different equipment configurations and temperature conditions. The standard frequency F1 of a reference block is determined via an ultrasonic tone burst generated by a first pulsed phased locked loop (P2L2) equipment configuration. Once a lock point number S is determined for F1, the reference frequency F1a of the reference block is determined at this lock point number via a second P2L2 equipment configuration to permit an equipment offset compensation factor Fo1=((F1-F1a)/F1)(1000000) to be determined. Next, a reference frequency F2 of the unloaded bearing member is determined using a second P2L2 equipment configuration and is then compensated for equipment offset errors via the relationship F2+F2-(Fo1)/1000000. A lock point number b is also determined for F2. A resonant frequency F3 is determined for the reference block using a third P2L2 equipment configuration to determine a second offset compensation factor F02=((F1-F3)/F1) 1000000. Next the resonant frequency F4 of the loaded bearing member is measured at lock point number b via the third P2L2 equipment configuration and the bolt load determined by the relationship (-1000000)CI(((F2-F4)/F2)-Fo2), wherein CI is a factor correlating measured frequency shift to the applied load. Temperature compensation is also performed at each point in the process NASA

N92-12303# Technische Univ., Eindhoven (Netherlands).
DEVELOPMENT OF TEST METHODS FOR DETERMINING MATERIAL DEFORMABILITY AND YIELD STRESS, ON THE BASIS OF INTERMETALLIC CONNECTIONS Ph.D. Thesis [ENTWICKLUNG VON PRUEFVERFAHREN ZUR BESTIMMUNG VON UMFORMBARKEIT UND FLIESSPANNUNG VON WERKSTOFFEN AUF DER BASIS INTERMETALLISCHER VERBINDUNGEN]
Rene Michael Hop 1991 156 p In GERMAN Sponsored by DFG
(ETN-91-90130) Avail: NTIS HC/MF A08

Methods are used at very high temperature, e.g., up to 1200 C. Using plastomechanical calculations and finite element method, evaluation processes were developed, with which the yield curve could be calculated. The characteristics of test methods are given. The shell cylinder immersion test, by which ductility is increased, is particularly suitable for very brittle materials. The great advantage of the step tensile test over conventional tensile tests, is the simple test execution. The ring compression test allows materials to be used such as they are, after fabrication in the flash smelting installation. The selection of the test method to be used, is to be done according to quantity and geometry of tests material, and according to mechanical machinability. ESA

N92-12304# Technische Univ., Eindhoven (Netherlands).
IDENTIFICATION OF THE MECHANICAL BEHAVIOR OF SOLID MATERIALS Ph.D. Thesis
Maximiliaan Alexande Hendriks 1991 106 p
(ISBN-90-386-0041-0; ETN-91-90140) Avail: NTIS HC/MF A06

An approach for the determination of material parameters based on the combination of the use of digital image analysis for the measurement of nonhomogeneous strain distributions on multiaxially loaded objects with arbitrary geometry, finite element modeling, and application of systems identification, is presented. The identification approach is tested by experiments on an orthotropic elastic membrane. Five parameters are identified using the experimental data of one single experiment. A comparison with classical tensile test yields good results. The application of the method for homogeneous materials is demonstrated by numerical simulations. Examples show the approach as offering possibilities for the characterization of solid materials. ESA

N92-12305# National Research Council of Canada, Ottawa (Ontario). Structures and Materials Lab.
A FEASIBILITY STUDY OF USING ABAQUS FINITE ELEMENT ANALYSIS FOR CREEP WITH MICROSTRUCTURAL MATERIAL DAMAGE
J. J. Kacprzynski Sep. 1990 151 p
(Contract DND-8464-90-RAG-06; IAR Proj. 07344)
(NRC-LTR-ST-1791; CTN-91-60259) Copyright Avail: NTIS HC/MF A08

A feasibility study of the finite element analysis of creep with microstructural material damage described by Kachanov-Rabotnov's constitutive equation has been completed. In the case studied, the material degradation determines the time to failure, which allows the problem to be represented by a single element only. The results of an ABAQUS analysis were compared to experimental creep data for aluminum alloy tension specimens. A relatively good agreement was obtained in the secondary and tertiary creep regions. The analytical technique employed may be used for the analysis of creep and for the determination of the life of components under stress at high temperatures.
Author (CISTI)

N92-12306*# Rockwell International Corp., Canoga Park, CA.
COMPOSITE LOAD SPECTRA FOR SELECT SPACE PROPULSION STRUCTURAL COMPONENTS Annual Report No. 2
J. F. Newell, R. E. Kurth, and H. Ho Nov. 1991 143 p

(Contract NAS3-24382)
(NASA-CR-189048; NAS 1.26:189048) Avail: NTIS HC/MF A07 CSCL 20K

The objective of this program is to develop generic load models with multiple levels of progressive sophistication to simulate the composite (combined) load spectra that are induced in space propulsion system components, representative of Space Shuttle Main Engines (SSME), such as transfer ducts, turbine blades, and liquid oxygen posts and system ducting. The first approach will consist of using state of the art probabilistic methods to describe the individual loading conditions and combinations of these loading conditions to synthesize the composite load spectra simulation. The second approach will consist of developing coupled models for composite load spectra simulation which combine the deterministic models for composite load dynamic, acoustic, high pressure, and high rotational speed, etc., load simulation using statistically varying coefficients. These coefficients will then be determined using advanced probabilistic simulation methods with and without strategically selected experimental data. Author

N92-12307*# Southwest Research Inst., San Antonio, TX.
PROBABILISTIC STRUCTURAL ANALYSIS METHODS (PSAM) FOR SELECT SPACE PROPULSION SYSTEMS COMPONENTS
Annual Report No. 5, Oct. 1989
Nov. 1991 95 p Original contains color illustrations
(Contract NAS3-24389)
(NASA-CR-187199; NAS 1.26:187199) Avail: NTIS HC/MF A05; 18 functional color pages CSCL 20K

Summarized here is the technical effort and computer code developed during the five year duration of the program for probabilistic structural analysis methods. The summary includes a brief description of the computer code manuals and a detailed description of code validation demonstration cases for random vibrations of a discharge duct, probabilistic material nonlinearities of a liquid oxygen post, and probabilistic buckling of a transfer tube liner. Author

N92-12308# Aerospatiale Aquitaine, Saint-Medard en Jalles (France).
STUDY OF ADHESIVE ELASTOPLASTIC GLUED JOINTS Summary Report [ETUDE DES LIAISONS COLLEES-ADHESIFS ELASTOPLASTIQUES. RAPPORT DE SYNTHESE]
J. P. Maigret and M. Martin 15 Nov. 1989 53 p In FRENCH
(Contract DRET-ARMINES-41086)
(Rept-NT-24192/AQEN; ETN-91-90112) Avail: NTIS HC/MF A04

Research carried out on the mechanical behavior of glued joints is described. Adhesion tests between metal and composite substrates, as well as between metal and metal and composite substrates, are described. The results of these tests are presented. A method for characterizing elastoplastic adhesives is outlined. Software tools which can be used in the analysis of the mechanical behavior of glued assemblages are discussed. ESA

N92-12309*# National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.
LARGE ANGLE TRANSIENT DYNAMICS (LATDYN) DOCUMENTATION. POST-PROCESSOR MANUAL
Maria V. Mitchum and A. Louis Abrahamson (Comtek Co., Grafton, VA.) Oct. 1991 45 p
(NASA-TM-104126; NAS 1.15:104126) Avail: NTIS HC/MF A03 CSCL 20K

The post processor program was developed to view Large Angle Transient Dynamics (LATDYN) output data in predefined, predetermined formats. The post processor is used for plotting data, creating and maintaining a data base of plotting requests, comparing and manipulating data sets in the data base, and the preparing plots for documentation. Author

N92-12310# Norwegian Defence Research Establishment, Kjeller.
THE EFFECT OF BERMING ON THE RESPONSE OF STRUCTURES SUBJECTED TO NEARBY DETONATIONS
Helge Langberg 24 May 1991 34 p
(FFI-91/4005; ISSN-0802-2437; ETN-91-90256) Avail: NTIS HC/MF A03

A series of small scale blast experiments was performed in order to study the effect of having a soil berm outside the wall of a structure. The experimental results showed in general good agreement with the results based on the pressure-impulse (P-I) diagram theory. This theoretical approach could be used for the study of a large concrete wall exposed to nearby detonations, showing that in most situations, a soil berm tends to reduce the vulnerability of protected structures. ESA

N92-12311# Aerospatiale, Suresnes (France). Dept. Materiaux.
IDENTIFICATION OF COMPLEX MODULES IN OTHOTROPIC MATERIALS BY MEANS OF FREE VIBRATION ANALYSIS [IDENTIFICATION DES MODULES COMPLEXES DE MATERIAUX ORTHOTROPES PAR ANALYSE DES VIBRATIONS LIBRES]
Gerard Dallemagne 1991 21 p In FRENCH
(Rept-911-550-101; ETN-91-90276) Avail: NTIS HC/MF A03

A technique for measuring complex material and structural modules is presented. Recordings of the free vibration characteristics of an excited rectangular plaque are the basis of the technique. The measurement procedure is designed to minimize involvement by the person testing. The measurement sensors are connected to a personal computer that carries out both the necessary calculations and directs and controls the process using A/D and D/A converters. ESA

N92-12312# Aeronautical Research Inst. of Sweden, Stockholm. Structures Dept.
OPTIMAL DESIGN OF NONLINEAR SHELL STRUCTURES
Ulf Torbjoern Ringertz May 1991 35 p Sponsored by Swedish Defence Material Administration, and Swedish Board for Technical Development
(FFA-TN-1991-18; ETN-91-90286) Avail: NTIS HC/MF A03

A numerical method for optimal design of nonlinear shell structures is described. The nonlinearity is only geometrical and the external load is assumed to be conservative. The nonlinear shell is analyzed using standard shell finite elements with the displacements and the rotation of the shell normals as independent analysis variables. Shell thicknesses and cross sectional dimensions of beam stiffeners are used as design variables. The proposed method for optimal design of nonlinear shell structures avoids trying to solve the equilibrium equations directly, given the design variables. This is accomplished by treating both the displacements and rotations describing the deformation, and the design variables. The equilibrium conditions are imposed as nonlinear equality constraints. Further constraints are imposed on structural stability. The nonlinear optimization problem is solved using a Newton barrier method. The usefulness of the proposed method is demonstrated on shallow stiffened shell structures exhibiting significant nonlinear response, and for which the optimal design corresponds to a structure where the stability constraint is critical. ESA

N92-12313# Aeronautical Research Inst. of Sweden, Stockholm. Structures Dept.
A REVIEW OF AERONAUTICAL FATIGUE INVESTIGATIONS IN SWEDEN DURING THE PERIOD MAY 1989 TO APRIL 1991
Anders F. Blom, ed. 13 May 1991 73 p Presented at 22nd International Committee on Aeronautical Fatigue Conference, Tokyo, Japan, 20-21 May 1991 Sponsored by Swedish Defence Material Administration
(FFA-TN-1991-24; ETN-91-90288) Avail: NTIS HC/MF A04

Work carried out in Sweden in the area of aeronautical fatigue is reviewed. Measurements of aircraft loading actions, basic studies of fatigue development in metals and composites, stress analysis

and fracture mechanics, studies of crack propagation and residual strength, testing of joints and full scale structures, and fatigue life predictions are included. ESA

N92-12314# Los Alamos National Lab., NM.
NUMERICAL SIMULATION OF PLASTICITY AT HIGH STRAIN RATE
L. G. Margolin and E. C. Flower (Lawrence Livermore National Lab., CA.) 1991 16 p Presented at the 1991 American Society of Mechanical Engineers Winter Meeting, Atlanta, GA, 1-6 Dec. 1991
(Contract W-7405-eng-36)
(DE91-011403; LA-UR-91-1292; CONF-911225-1) Avail: NTIS HC/MF A03

In numerical simulations of solid dynamics, the total strain rates are calculated from the velocity fields and are input to the constitutive laws. For an elastic-plastic material, the strain rate for a computational cycle may cause the elastic stress to exceed the specified yield surface. This implies that the stress path must move along the yield surface, and some of the strain is realized as plastic (irreversible) strain. The usual numerical method of integrating the elastic-plastic stress-strain relations is a construction procedure by Wilkins. The virtue of this construction is that it is simple. Sometimes the procedure is inaccurate and leads to incorrect final stress states and plastic strain. In the computer programs, the computational time step is controlled so that the total strain rate can be assumed to be constant over a cycle. With this assumption, it is possible to find a simple yet exact expression for the final stress states for a large variety of yield surfaces. We will derive this expression assuming only that the yield surface does not explicitly depend on the deviator stresses themselves. A numerical program is used to compare the results of Wilkins' construction with new results for particular strain paths. DOE

N92-12315# Oak Ridge National Lab., TN.
A METHOD FOR MULTIAXIAL FATIGUE LIFE PREDICTION USING ENERGY APPROACHES
K. C. Liu 1991 26 p Presented at the American Society for Testing and Materials (ASTM) Symposium on Thermo-Mechanical Fatigue: Behavior of Materials, San Diego, CA, 14-17 Oct. 1991
(Contract DE-AC05-84OR-21400)
(DE91-018851; CONF-911048-2) Avail: NTIS HC/MF A03

Fatigue criteria based on the concept of damage energy have been proposed and evaluated with experimental fatigue data generated under uniaxial as well as biaxial loading conditions. Most of the energy-based methods utilize plastic energy of stress-strain hysteresis loops as a correlating parameter. Limited success has been made in predicting fatigue life in the low-cycle fatigue range where the plastic energy of the hysteresis loops is well defined. However, it is difficult to estimate the plastic hysteresis energy in the high-cycle range where the stress-strain behavior is virtually elastic. Failure to adequately predict high-cycle fatigue life is an obvious shortcoming of the plastic energy-based method. A new method is proposed for multiaxial fatigue life prediction using strain energy as a correlating parameter which is physically associated with modes of fatigue fracture on a critical plane of the material that may be sensitive to either axial stress or shear at a given temperature. Biaxial fatigue data were analyzed for type 304 stainless steel and SAE 1045 steel subjected to in-phase and 90 degrees out-of-phase tension/torsion loading at room and elevated temperatures. Comparisons were made between the experimental data and theoretical predictions to show the effectiveness to the new energy-based approach. DOE

N92-12316*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, OH.
MODAL INTERACTION IN LINEAR DYNAMIC SYSTEMS NEAR DEGENERATE MODES
D. Afolabi (Purdue Univ., Indianapolis, IN.) Nov. 1991 47 p
(NASA Order C-99066-G)
(NASA-TM-105315; ICOMP-91-21; E-6668; NAS 1.15:105315)
Avail: NTIS HC/MF A03 CSCL 20K

In various problems in structural dynamics, the eigenvalues of a linear system depend on a characteristic parameter of the system. Under certain conditions, two eigenvalues of the system approach each other as the characteristic parameter is varied, leading to modal interaction. In a system with conservative coupling, the two eigenvalues eventually repel each other, leading to the curve veering effect. In a system with nonconservative coupling, the eigenvalues continue to attract each other, eventually colliding, leading to eigenvalue degeneracy. Modal interaction is studied in linear systems with conservative and nonconservative coupling using singularity theory, sometimes known as catastrophe theory. The main result is this: eigenvalue degeneracy is a cause of instability; in systems with conservative coupling, it induces only geometric instability, whereas in systems with nonconservative coupling, eigenvalue degeneracy induces both geometric and elastic instability. Illustrative examples of mechanical systems are given. Author

42 GEOSCIENCES (GENERAL)

No abstracts in this category.

43 EARTH RESOURCES AND REMOTE SENSING

Includes remote sensing of earth resources by aircraft and spacecraft; photogrammetry; and aerial photography.

For instrumentation see *35 Instrumentation and Photography.*

N92-12317*# Computer Sciences Corp., Beltsville, MD. System Sciences Div.
MICROWAVE REMOTE SENSING AND RADAR POLARIZATION SIGNATURES OF NATURAL FIELDS Final Report, 17 Nov. 1987 - 9 Nov. 1989
Tsan Mo Nov. 1989 108 p
(Contract NAS5-30116)
(NASA-CR-189249; NAS 1.26:189249; CSC/TM-89/6138) Avail: NTIS HC/MF A06 CSCL 17I

Theoretical models developed for simulation of microwave remote sensing of the Earth surface from airborne/spaceborne sensors are described. Theoretical model calculations were performed and the results were compared with data of field measurements. Data studied included polarimetric images at the frequencies of P band, L band, and C band, acquired with airborne polarimeters over a agricultural field test site. Radar polarization signatures from bare soil surfaces and from tree covered fields were obtained from the data. The models developed in this report include: (1) Small perturbation model of wave scatterings from randomly rough surfaces, (2) Physical optics model, (3) Geometrical optics model, and (4) Electromagnetic wave scattering from dielectric cylinders of finite lengths, which replace the trees and branches in the modeling of tree covered field. Additionally, a three-layer emissivity model for passive sensing of a vegetation covered soil surface is also developed. The effects of surface roughness, soil moisture contents, and tree parameters on the polarization signatures were investigated. Author

N92-12318# Oak Ridge National Lab., TN.
REPORT OF A WORKSHOP ON USING REMOTE SENSING TO ESTIMATE LAND USE CHANGE
V. H. Dale, ed. Apr. 1990 54 p
(Contract DE-AC05-84OR-21400)
(DE90-011278; ORNL/TM-11502; ESD-Publ-3397) Avail: NTIS HC/MF A04

A workshop, held in Washington, DC, February 22 to 24, 1989,

assembled leading international researchers to discuss recent research results and to identify short- and long-term research objectives that use remote sensing to improve estimates of the carbon flux to the atmosphere caused by changes in land use. Research summaries included remote sensing studies to estimate changes in land area, amount of biomass burning and its effect on atmospheric CO2, and areas of human disturbances. Research strategies to estimate changes in land use that affect the CO2 flux were discussed. Working groups were formed to concentrate on the specifics of the research strategy, the relation of remote sensing to other research activities, and the collaborative aspects of the remote sensing research. This report presents the findings of the working groups. DOE

N92-12319*# American Univ., Washington, DC. Dept. of Computer Science and Information Systems.
SENSORY PROCESSING AND WORLD MODELING FOR AN ACTIVE RANGING DEVICE
Tsai-Hong Hong and Angela Y. Wu Sep. 1991 156 p
(Grant NAG5-1344)
(NASA-CR-188915; NAS 1.26:188915) Avail: NTIS HC/MF A08 CSCL 08B

In this project, we studied world modeling and sensory processing for laser range data. World Model data representation and operation were defined. Sensory processing algorithms for point processing and linear feature detection were designed and implemented. The interface between world modeling and sensory processing in the Servo and Primitive levels was investigated and implemented. In the primitive level, linear features detectors for edges were also implemented, analyzed and compared. The existing world model representations is surveyed. Also presented is the design and implementation of the Y-frame model, a hierarchical world model. The interfaces between the world model module and the sensory processing module are discussed as well as the linear feature detectors that were designed and implemented. Author

N92-12320 Florida State Univ., Tallahassee.
ESTIMATION OF SURFACE HEAT AND MOISTURE FLUXES OVER A PRAIRIE GRASSLAND USING A HYBRID BIOSPHERE/REMOTE SENSING MODEL Ph.D. Thesis
William Lewis Crosson 1991 286 p
Avail: Univ. Microfilms Order No. DA9124607

A procedure is described for estimating surface heat and moisture fluxes based on the use of remotely sensed satellite measurements and a biosphere model. Data collection and processing procedures are presented along with the measurement analysis for the entire 1987 FIFE (First ISLSCP Field Experiment). Two stations measured surface layer gradients of temperature and moisture. These data were used in the determination of evapotranspiration based on the Bowen ratio method. A procedure is developed for filtering the flux time series. The filter, based on a 2-D Fourier transform, preserves the basic diurnal features and longer time scales while removing high frequency noise which cannot be attributed to site induced variation. The design and formulation of an experimental biosphere model (ExBATS) is described. ExBATS was designed to incorporate in situ measurements and satellite parameterizations of certain canopy variables (surface albedo, leaf area index, and stomatal resistance). The results of a series of numerical experiments using ExBATS are presented. These simulations were performed to assess how the model performs when remotely sensed data are used to estimate the canopy variables. Dissert. Abstr.

N92-12321*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, MD.
THE SENSITIVITY OF SYNTHETIC APERTURE RADIOMETERS FOR REMOTE SENSING APPLICATIONS FROM SPACE
D. M. LeVine Washington Dec. 1989 50 p
(NASA-TM-100741; Rept-989B00173; NAS 1.15:100741) Avail: NTIS HC/MF A03 CSCL 14B

Aperture synthesis offers a means of realizing the full potential of microwave remote sensing from space by helping to overcome the limitations set by antenna size. The result is a potentially lighter, more adaptable structure for applications in space. However, because the physical collecting area is reduced, the signal-to-noise ratio is reduced and may adversely affect the radiometric sensitivity. Sensitivity is an especially critical issue for measurements to be made from low earth orbit because the motion of the platform limits the integration time available for forming an image. The purpose is to develop expression for the sensitivity of remote sensing systems which use aperture synthesis. The objective is to develop basic equations general enough to be used to obtain the sensitivity of the several variations of aperture synthesis which were proposed for sensors in space. The conventional microwave imager (a scanning total power radiometer) is treated as a special case and a comparison of three synthetic aperture configurations with the conventional imager is presented. Author

N92-12322# Aerospatiale, Cannes (France). Strategic and Space System Div.
MERIS DATA COMPRESSION: A PRESENTATION OF THE CURRENT STATUS OF THE STUDY
J. M. Nakache 1991 8 p
(Rept-911-440-113; ETN-91-90273) Avail: NTIS HC/MF A02

The development of the new generation of Earth imaging spectrometer on the polar platform leads to high data rate at instrument output and to significant platform storage requirements, making useful image compression. The current status of the study under ESA/MDA contract related to the Medium Resolution Imaging Spectrometer (MERIS) data encoding technology is described. A preliminary description of MERIS characteristics versus existing on board instruments will underline the need of modelization for the generation of the reference images. Then emphasis will be laid on the interest or drawbacks of different generations of existing compression algorithms to the MERIS application in term of performances measurement, image quality degradation and algorithm implementation feasibility. ESA

N92-12323# Geological Survey, Denver, CO.
GEOLOGIC MAPPING OF TUNNELS USING PHOTOGRAMMETRY-CONTROL-POINT CONFIGURATION
J. A. Coe and K. S. Dueholm 1991 36 p
(Contract DE-AI08-78ET-44802)
(DE91-019071; USGS-OFR-90-37) Avail: NTIS HC/MF A03

A photogrammetric method has been developed by the U.S. Geological Survey and the U.S. Bureau of Reclamation for use in geologic mapping of tunnels (drifts). The method requires photographing the tunnel walls and roof with a calibrated small-format camera to obtain stereo pairs of photos which are then oriented in an analytical stereo plotter for measurement of geologic features. The accuracy of the mapping depends, in part, on the control configuration used to orient the photos. Accuracy experimentation using a block of 16 small-frame-stereoscopic models was performed. Systematic control configurations were tested, using bundle adjustment calculations, to determine the effect on the absolute accuracy of point measurements in oriented blocks of photos. Surveyed targets and camera-station coordinates were used as control. Fifteen control targets produced reliable and robust-orientation results with RMS coordinate errors less than 3.0 mm. Four control targets, combined with 20 camera stations, produced equally good results. DOE

44 ENERGY PRODUCTION AND CONVERSION

Includes specific energy conversion systems, e.g., fuel cells; global sources of energy; geophysical conversion; and windpower.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power,* and *28 Propellants and Fuels.*

N92-12324# Sandia National Labs., Albuquerque, NM.
TRENDS IN DISH-STIRLING SOLAR RECEIVER DESIGNS

R. B. Diver, C. E. Andraka, J. B. Moreno, D. R. Adkins, and T. A. Moss 1990 9 p Presented at the 25th Intersociety Energy Conversion Engineering Conference, Reno, NV, 12-17 Aug. 1990
(Contract DE-AC04-76DP-00789)
(DE90-011507; SAND-90-1236C; CONF-900801-10) Avail: NTIS HC/MF A02

The dish-Stirling solar energy system, because of its high efficiency, is a leading candidate for producing low cost electric power from the sun. Dish-Stirling receiver design involves dealing with non-uniform and highly concentrated solar flux at high temperatures (700 to 800 C) and, therefore, presents a variety of technical challenges. The technology is in the process of evolving from directly illuminated heater head tube receivers to receivers that use refluxing (i.e., gravity assisted) liquid metals as an intermediate heat transfer fluid. Modern dish-Stirling development was initiated in the late 1970s by the Jet Propulsion Laboratory for the Department of Energy. The JPL technology development with United Stirling, Inc. involved the USAB 4.95 Stirling engine and directly illuminated heater-head tube receivers. This work eventually led to the successful demonstrations and world record efficiencies by Advanco Corp., and to the attempted commercialization of the technology by McDonnell Douglas Corp. The severe nature of concentrated solar flux and the potential advantages of heat pipe technology have caused an evolution toward reflux receivers. These receivers are just beginning to be tested in the laboratory and integrated with dish-Stirling systems. In this paper, the history and current status of dish-Stirling receiver development are presented and discussed. The technical challenges to be addressed by the dish-Stirling community and the future plans at Sandia are outlined. DOE

N92-12325# Oak Ridge National Lab., TN.
CONVENTIONAL WALLBOARD WITH LATENT HEAT STORAGE FOR PASSIVE SOLAR APPLICATIONS
R. J. Kedl 1990 5 p Presented at the 25th Intersociety Energy Conversion Engineering Conference, Reno, NV, 12-17 Aug. 1990
(Contract DE-AC05-84OR-21400)
(DE90-012136; CONF-900801-14) Avail: NTIS HC A01

Conventional wallboard impregnated with octadecane paraffin (melting point -- 73.5 F) is being developed as a building material with latent heat storage for passive solar applications. Impregnation was accomplished simply by soaking the wallboard in molten paraffin. Concentrations of paraffin in the combined product as high as 35 percent by weight were achieved. In support of this concept, a computer model was developed to describe thermal transport and storage by a phase change material (PCM) dispersed in a porous media. The computer model was confirmed by comparison with known analytical solutions where the PCM melts at a specific melting point. However, agreement between the model and an experimentally produced thermal transient involving impregnated wallboard was only good after the model was modified to allow the paraffin to melt over a temperature range. This was accomplished by replacing the heat of fusion with a triangular heat capacity relationship that mimics the triangular melt curve found through differential scanning calorimetry. When this change was made, agreement between the model and the experimental transient was very good. DOE

N92-12326# Oak Ridge National Lab., TN.
ANALYSIS OF WALLBOARD CONTAINING A PHASE CHANGE MATERIAL
J. J. Tomlinson and D. P. Heberle 1990 6 p Presented at the 25th Intersociety Energy Conversion Engineering Conference, Reno, NV, 12-17 Aug. 1990
(Contract DE-AC05-84OR-21400)
(DE90-012163; CONF-900801-13) Avail: NTIS HC A02

Phase change materials (PCMs) used on the interior of buildings hold the promise for improved thermal performance by reducing the energy requirements for space conditioning and by improving thermal comfort by reducing temperature swings inside the building. Efforts are underway to develop a gypsum wallboard containing a hydrocarbon PCM. With a phase change temperature in the room temperature range, the PCM wallboard adds substantially to the thermal mass of the building while serving the same architectural function as conventional wallboard. To determine the thermal and economic performance of this PCM wallboard, the Transient Systems Simulation Program (TRNSYS) was modified to accommodate walls that are covered with PCM plasterboard, and to apportion the direct beam solar radiation to interior surfaces of a building. The modified code was used to simulate the performance of conventional and direct-gain passive solar residential-sized buildings with and without PCM wallboard. Space heating energy savings were determined as a function of PCM wallboard characteristics. Thermal comfort improvements in buildings containing the PCM were qualified in terms of energy savings. The report concludes with a present worth economic analysis of these energy savings and arrives at system costs and economic payback based on current costs of PCMs under study for the wallboard application. DOE

N92-12327# Department of Energy, Washington, DC. Office of Program Analysis.
BASIC ENERGY SCIENCES: SUMMARY OF ACCOMPLISHMENTS
May 1990 60 p
(DE90-011269; DOE/ER-0455P) Avail: NTIS HC/MF A04

For more than four decades, the Department of Energy, including its predecessor agencies, has supported a program of basic research in nuclear- and energy related sciences, known as Basic Energy Sciences. The purpose of the program is to explore fundamental phenomena, create scientific knowledge, and provide unique user facilities necessary for conducting basic research. Its technical interests span the range of scientific disciplines: physical and biological sciences, geological sciences, engineering, mathematics, and computer sciences. Its products and facilities are essential to technology development in many of the more applied areas of the Department's energy, science, and national defense missions. The accomplishments of Basic Energy Sciences research are numerous and significant. Not only have they contributed to Departmental missions, but have aided significantly the development of technologies which now serve modern society daily in business, industry, science, and medicine. In a series of stories, this report highlights 22 accomplishments, selected because of their particularly noteworthy contributions to modern society. A full accounting of all the accomplishments would be voluminous. Detailed documentation of the research results can be found in many thousands of articles published in peer-reviewed technical literature. DOE

N92-12328# Oak Ridge National Lab., TN.
A SUMMARY OF THE STATUS OF BIOMASS CONVERSION TECHNOLOGIES AND OPPORTUNITIES FOR THEIR USE IN LATIN AMERICA
D. B. Waddle and R. D. Perlack Mar. 1990 18 p Presented at the Pan American Engineers: Partners for Progress, Washington, DC, 19-24 Aug. 1990
(Contract DE-AC05-84OR-21400)
(DE90-012284; CONF-9008104-2) Avail: NTIS HC/MF A03

Biomass plays a significant role in energy use in developing countries; however, these resources are often used very inefficiently. Recent technology developments have made possible improved conversion efficiencies for utility scale technologies. These developments may be of interest in the wake of recent policy changes occurring in Central America, with respect to independent power production. Efforts are also being directed at developing biomass conversion technologies that can interface and/or compete with internal combustion engines for small, isolated loads. This paper reviews the technological status of biomass conversion technologies appropriate for commercial, industrial, and small utility applications in developing countries, and in Latin America in particular. Market opportunities, constraints, and technology developments are also discussed. DOE

N92-12329# West Virginia Univ., Morgantown. Dept. of Statistics and Computer Science.
IMPLEMENTATION OF A MODIFIED JOHNSON AND HINDMARSH MASS AND ENERGY MODEL
G. Trapp Apr. 1990 15 p
(Contract DE-FC21-87MC-24207)
(DE90-000488; DOE/MC-24207/2826) Avail: NTIS HC/MF A03

The primary purpose of this research work was to provide METC with computer software to simulate various fossil fuel process configurations. In particular, software to simulate mass and energy transfer for various fossil fuel reactions was required. To these ends the code MSRS was installed and tested at METC and then enhanced into an engineering modeling code useable by METC scientists and engineers. The enhancements consisted of adding reaction capabilities which grew out of XELAMP, improved input capabilities which made the code easier to use, and increased output media such as graphics. The input and output capabilities were patterned after the XELAMP system. Validation and consistency of the work can be checked using the LFER code: output from LFER can be input to MSRS and the corresponding temperatures can be compared. DOE

N92-12330# California Univ., Berkeley. Lawrence Berkeley Lab.
A DATABASE FOR THE GEYSERS GEOTHERMAL FIELD
G. S. Bodvarsson, B. L. Cox, P. Fuller, M. Ripperda, H. Tulinius, P. A. Witherspoon, N. Goldstein, S. Flexser, K. Pruess, and A. Truesdell (Geological Survey, Menlo Park, CA.) Sep. 1989 257 p
(Contract DE-AC03-76SF-00098)
(DE90-013811; LBL-28618-3/3) Avail: NTIS HC/MF A12

This document contains graphs of data collected from Geysers Geothermal Field. These graphs display data concerning wellhead pressure and degrees of super heat from 1968 to 1988 in Appendix B; injection rate and cumulative injection rate in Appendix C. DOE

N92-12331# Kauppa-ja Teollisuusministerio, Helsinki (Finland). Energiaosasto.
ELECTRICITY FROM WASTE HEAT
Jaakko Larjola, Olli Lindgren, and Esa Vakkilainen 1991 174 p
(DE91-527080; KTM/E-D-194) Avail: NTIS HC/MF A08

In industry and in ships, large amounts of waste heat with quite a high release temperature are produced: examples are combustion gases and the exhaust gases of ceramic kilns. Very often they cannot be used for heating purposes because of long transport distances or because there is no local district heating network. Thus, a practical solution would be to convert this waste heat into electric power. This conversion may be carried out using an ORC-plant (Organic Rankine Cycle). There are probably some twenty ORC-plants in commercial use in the world. They are, however, usually based on conventional power plant technology, and are rather expensive, complicated and may have significant maintenance expenses. In order to obviate these problems, a project was started at Lappeenranta University of Technology at the beginning of 1981 to develop a high-speed, hermetic turbogenerator as the prime mover of the ORC. With this new technology the whole ORC-plant is quite simple, with only one moving part in the power system. It is expected to require very little maintenance, and the calculations made give for it significantly lower specific price than for the conventional technology ORC-plant. Two complete prototypes of the new technology ORC-plant have been built, one to the laboratory, other to industrial use. The nominal output of both is 100 kW electricity. Calculated amortization times for the new ORC-plant range from 2.1 to 6. DOE

N92-12332*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
RESULTS OF THE 1991 NASA/JPL BALLOON FLIGHT SOLAR CELL CALIBRATION PROGRAM
B. E. Anspaugh and R. S. Weiss 1 Oct. 1991 24 p
(NASA-CR-188968; JPL-Publ-91-36; NAS 1.26:188968) Avail: NTIS HC/MF A03 CSCL 10A

The 1991 solar cell calibration balloon flight was completed on August 1, 1991. All objectives of the flight program were met. Thirty-nine modules were carried to an altitude of 119,000 ft. (36.3 km). Data telemetered from the modules were corrected to 28 C and to 1 AU. The calibrated cells have been returned to the participants and can now be used as reference standards in simulator testing of cells and arrays. Author

N92-12333# Midwest Research Inst., Golden, CO.
OCEAN ENERGY CONTRACT LIST, FISCAL YEAR 1990
Aug. 1991 6 p
(Contract DE-AC02-83CH-10093)
(DE91-002177; DOE/CH-10093/100/1991) Avail: NTIS HC/MF A02

The purpose of the Federal Ocean Energy Technology (OET) Program is to develop techniques that harness ocean energy (waves, currents, and thermal and salinity gradients) in a cost-effective and environmentally acceptable manner. The OET Program seeks to develop ocean energy technology to a point at which the commercial sector can assess whether applications of the technology are viable energy conversion alternatives or supplements to systems. The Federal OET Program is conducted by DOE and is assigned to the Assistant Secretary for Conservation and Renewable Energy. Past studies conducted by the U.S. Department of Energy (DOE) have identified ocean thermal energy conversion (OTEC) as the largest potential contributor to U.S. energy supplies from the ocean resource. As a result, the OET Program concentrates on research to advance OTEC technology. The FY 1990 contract overview comprises a list of all subcontracts begun, ongoing, or completed during FY 1990 (October 1, 1989, through September 30, 1990). Under each managing laboratory, projects are listed alphabetically by project area and then by subcontractor name. DOE

N92-12334# Midwest Research Inst., Golden, CO. Solar Energy Research Inst.
PHOTOVOLTAICS: NEW OPPORTUNITIES FOR UTILITIES
Jul. 1991 32 p
(Contract DE-AC02-83CH-10093)
(DE91-002168; DOE/CH-10093/113) Avail: NTIS HC/MF A03

This publication presents information on photovoltaics. The following topics are discussed: residential photovoltaics- the New England experience builds confidence in PV; Austin's 300-kW Photovoltaic Power Station- evaluating the breakeven costs; residential photovoltaics- the lessons learned; photovoltaics for electric utility use; least-cost planning- the environmental link; photovoltaics in the distribution system; photovoltaic systems for the rural consumer; the issues of utility-intertied photovoltaics; and photovoltaics for large-scale use- costs ready to drop again. DOE

N92-12335# Midwest Research Inst., Golden, CO. Solar Energy Research Inst.
RESEARCH ON STABLE, HIGH-EFFICIENCY, AMORPHOUS SILICON MULTIJUNCTION MODULES Annual Report, 1 May 1990 - 30 Apr. 1991
A. Catalano, M. Bennet, L. Chen, B. Fieselmann, Y. Li, J. Newton, R. Podlesny, S. Wiedeman, and L. Yang (Solarex Corp., Newtown, PA.) Aug. 1991 60 p
(Contract DE-AC02-83CH-10093)
(DE91-015002; SERI/TP-214-4405) Avail: NTIS HC/MF A04

The present effort seeks to develop modules with a stabilized performance of 8.8 pct. aperture area conversion after 600 hours light exposure (AM1.5) at 50 C in modules with aperture areas over 900 sq cm. Good progress towards this goal has been obtained with the demonstration of 9.8 pct. initial performance in a submodule incorporating devices with relatively thin middle junction i-layer thickness of 4000 A. Devices with this design have been shown to lose about 10 pct. of their initial performance after 1000 hours of exposure. Modules lose between 18 to 23 pct. largely due to light induced shunting, probably related to the contact metallization. Achieving long term stabilized efficiencies of 12 pct. or more requires substantial improvements in materials and devices.

Our analysis has shown that substantial optical losses occur at both front and rear contacts which we hope to address with ZnO films prepared by CVD and sputtering processes now under development. Further progress in doped layers and alloys are also needed. Fundamental studies of the relationship between material structure and processes (particularly the effect of hydrogen dilution) are reported. DOE

N92-12336# Argonne National Lab., IL.
PRODUCTION OF DESALINATED WATER USING OCEAN THERMAL ENERGY
T. Rabas and C. Panchal 1991 8 p Presented at the Oceans '91, Honolulu, HI, 1-3 Oct. 1991
(Contract W-31-109-eng-38)
(DE91-018894; ANL/CP-72704; CONF-9110218-1) Avail: NTIS HC/MF A02

This paper describes an Ocean Thermal Energy Conversion (OTEC) desalination plant that consists of a multistage flash evaporator (MSF), a closed-cycle OTEC power plant, and an appropriate seawater system depending if the desalination plant is land based or floating. OTEC desalination plants of this type are preferred because the production of desalinated water far exceeds that obtained from other OTEC plant types employing the same size seawater system. The focus of the paper is on the multistage flash evaporator. The similarities and differences between conventional MSF and OTEC multistage flash evaporators (OTEC-MSF) are first described. Then the details of the OTEC-MSF evaporator design are discussed and preliminary correlations are recommended for the three major elements: the flash chamber, the moisture removal device, and the condenser. Recent advances such as enhanced condenser tubes, condensers of the compact type, and corrugated-plate moisture separators are introduced into the design. Comparisons of the water production capability, evaporator shell volume, and material cost are then presented for state-of-the-art and the new design concepts. DOE

N92-12337# Pacific Northwest Lab., Richland, WA.
PARTICLE MEASUREMENT AND BRINE CHEMISTRY AT THE SALTON SEA DEEP WELL
R. J. Robertus, C. H. Kindle, R. G. Sullivan, and D. W. Shannon Sep. 1991 43 p
(Contract DE-AC06-76RL-01830)
(DE92-000031; PNL-7794) Avail: NTIS HC/MF A03

The Advanced Brine Chemistry Project, a part of the U.S. Department of Energy's Geothermal Energy Program, is addressing operating problems associated with scaling and corrosion at geothermal power plants. Under this project, Pacific Northwest Laboratory conducted a series of tests at the Salton Sea Deep Well, which has one of the highest solids contents in the world. The purpose of the tests was to evaluate monitoring instrumentation under field conditions and relate particulate formation to the brine chemistry. The instrumentation, was evaluated under scaling geothermal conditions using two different principles: ultrasonic reflection and laser light scattering. The following conclusions were drawn from the instrumentation testing and brine chemistry and particulate analyses. (1) Using reflected ultrasonic impulses to detect suspended particles has been demonstrated for on-line application in a geothermal brine with strong scaling tendencies. Advantages over laser light scattering include improved high-temperature durability for the transducer and longer operation with less maintenance. (2) Counting and sizing particles using laser light scattering requires constant maintenance in geothermal applications. (3) Silica is the dominant scale species and appears in amounts orders of magnitude greater than other minor species such as barium sulfate. (4) The silica that formed at high temperatures and short residence times is very gelatinous and difficult to filter out of the brine. (5) Correlation of instrument readings with particle collection data was difficult because conditions on the filter (i.e., temperature, flowrate, and pressure) could not be maintained constant for long enough intervals to obtain comparable information. DOE

N92-12338# Pacific Northwest Lab., Richland, WA.
MOBILE ENERGY LABORATORY ENERGY-EFFICIENCY TESTING PROGRAMS
G. B. Parker and J. W. Currie Sep. 1991 119 p
(Contract DE-AC06-76RL-01830)
(DE92-000039; PNL-7793) Avail: NTIS HC/MF A06

This report summarizes energy-efficiency testing activities applying the Mobile Energy Laboratory (MEL) testing capabilities during the first and second quarters of fiscal year (FY) 1991. The MELs, developed by the U.S. Department of Energy (DOE) Federal Energy Management Program (FEMP), are administered by Pacific Northwest Laboratory (PNL) and the Naval Energy and Environmental Support Activity (NEESA) for energy testing and energy conservation program support functions at Federal facilities. The using agencies principally fund MEL applications, while DOE/FEMP funds program administration and capability enhancement activities. This report fulfills the requirements established in Section 8 of the MEL Use Plan (PNL-6861) for semiannual reporting on energy-efficiency testing activities using the MEL capabilities. The MEL Use Committee, formally established in 1989, developed the MEL Use Plan and meets semiannually to establish priorities for energy-efficient testing applications using the MEL capabilities. The MEL Use Committee is composed of one representative each of the U.S. Department of Energy, U.S. Army, U.S. Air Force, U.S. Navy, and other Federal agencies. DOE

45 ENVIRONMENT POLLUTION

Includes atmospheric, noise, thermal, and water pollution.

N92-12339# Sandia National Labs., Albuquerque, NM.
THE POTENTIAL IMPACT OF CONSERVATION AND ALTERNATIVE ENERGY SOURCES ON CARBON DIOXIDE EMISSIONS
M. W. Edenburn and E. A. Aronson 1990 7 p Presented at the Annual Meeting of the Geothermal Resources Council and International Symposium on Geothermal Energy, Kailua Kona, 20-24 Aug. 1990
(Contract DE-AC04-76DP-00789)
(DE90-008346; SAND-89-1380C; CONF-900823-2) Avail: NTIS HC/MF A02

In this report, we examine two global energy consumption scenarios to determine how each will contribute to the greenhouse effect and global warming. A steady emissions trend scenario assumes only modest energy conservation and little change in the world's energy conservation and little change in the world's energy consumption patterns. A reduced emissions trend scenario assumes significant conservation and switching from a more carbon-intensive energy source mix to a less intensive mix. Based on the difference between the two scenarios' results, we conclude that it is possible to reduce carbon dioxide emissions by more than 50 percent by 2050 using a combination of conservation and efficiency improvements and increased use of nuclear, geothermal, and solar/renewable energy sources. DOE

N92-12340# Sandia National Labs., Albuquerque, NM.
THE GREENHOUSE EFFECT AND ACID RAIN
R. K. Traeger 1990 3 p Presented at the Annual Meeting of the Geothermal Resources Council and International Symposium on Geothermal Energy, Kailua Kona, 20-24 Aug. 1990
(Contract DE-AC04-76DP-00789)
(DE90-008347; SAND-90-0537C; CONF-900823-1) Avail: NTIS HC/MF A01

The concentrations of carbon dioxide, methane, sulfur dioxide, nitrous oxides and chlorofluorocarbons is increasing in the earth's atmosphere. Increased concentrations of these trace gases could lead to global warming, increased acid rain and increased UV radiation on the earth's surface; however, the actual impacts are still uncertain and are also the subject of great debate. Application of clean energy sources such as geothermal are obviously desirable

for decreasing these effects and improving our overall general environment. This paper briefly summarizes the global environment concerns, providing a backdrop for the following papers which describe the geothermal role in future environmental considerations. DOE

N92-12341# Savannah River Ecology Lab., Aiken, SC.
ECOLOGICAL RESEARCH BETWEEN THE UNIV. OF GEORGIA AND DOE. VOLUME 1: MAIN REPORT Annual Report, period ended 31 Jul. 1989
1990 25 p
(Contract DE-AC09-76SR-00819)
(DE90-012109; SRO-819-20-Vol-1) Avail: NTIS HC/MF A03

Opportunities to study and understand the importance of both man-induced and natural environmental stresses are available to researchers on the Savannah River Site (SRS). Energy technologies have an impact on natural habitats and the associated plant and animal communities in a variety of ways. The transport, fate, and ecological effects of a variety of chemicals such as radionuclides, organic contaminants, and trace metals must be understood. In addition, construction, forestry programs, thermal releases, and other activities that affect terrestrial and aquatic environments are recognized nationally as having major impacts. These concerns have led to a variety of questions about the consequences of SRS activities on environmental systems and form a basis for research by scientists at Savannah River Ecology Laboratory (SREL). Research at SREL can involve a variety of approaches, including field research, research in controlled environments such as greenhouses, and laboratory studies that require the use of sophisticated instrumentation. Highlights of research activities during FY89 at SREL over the past year are presented. Complete abstracts of specific projects are appended. DOE

N92-12342# Oak Ridge National Lab., TN.
GLOBAL CLIMATE CHANGE AND HUMAN HEALTH: INFORMATION NEEDS, RESEARCH PRIORITIES, AND STRATEGIC CONSIDERATIONS
Michael P. Farrell, Paul Kanciruk, and Frederick M. OHara, Jr. 1989 10 p Presented at the Global Atmospheric Change and Public Health Conference, Washington, DC, 5-6 Dec. 1989
(Contract DE-AC05-84OR-21400)
(DE90-012599; CONF-891292-1) Avail: NTIS HC/MF A02

The U.S. Global Research Plan and the International Geosphere-Biosphere Program were created to assess the effects of global climate change but have not been able to devote much attention to the consequences climate change will have on human health and welfare. Although researchers and policy makers recognize that climate change will have complex effects on resources, in general, the social and medical sciences have not received appropriate international attention under the banner of global change. To address this imbalance, the public health research community needs to launch a international coordinated effort so that the social and medical sciences are as fully represented as other scientific disciplines. This document discusses the information needs, research priorities and strategic considerations of the global change and its impact on human health. DOE

N92-12343# Lawrence Livermore National Lab., CA.
A CONCEPT FOR TREATING DENSE-GAS DISPERSION UNDER REALISTIC CONDITIONS OF TERRAIN AND VARIABLE WINDS
Donald L. Ermak May 1990 6 p Presented at the 1990 Joint Army-Navy-NASA-Air Force Safety and Environmental Protection Conference, Livermore, CA, 18-22 Jun. 1990
(Contract W-7405-eng-48)
(DE90-012892; UCRL-JC-104039; CONF-9006210-1) Avail: NTIS HC/MF A02

A method is presented for including dense-gas effects in an existing advection-diffusion (particle-in-cell) type model capable of dispersion simulations over terrain and with time-varying synoptic winds. The physical processes associated with dense-gas dispersion affect both the windfield and the turbulent diffusivity. We propose to include these effects by perturbing the ambient windfield and diffusivity within the local region of the dense-gas cloud. The perturbed local windfield will be calculated by using a vertical or layer averaging approach and will be nested between the windfield and dispersion calculations. The ambient diffusivity will be replaced by an adapted form of a dense-gas, K-theory diffusivity that has the property that it approaches the ambient diffusivity level as the cloud density approaches the ambient value. For numerical models, the low-lying nature of dense-gas clouds often presents a problem with resolution in the vertical direction. This is largely overcome in the proposed approach by: (1) the use of vertical averaging and assumed vertical cloud profiles to calculate the dense-gas perturbations on the flow field and diffusivity, and (2) the use of the particle-in-cell technique with a Monte Carlo (stochostic) displacement equation that does not rely on the concentration gradient to calculate the trajectories of the concentration marker particles. These dense-gas dispersion modifications attempt to preserve the main features of the advection-diffusion, particle-in-cell model and, thereby, minimize the impact on the existing code. All of the changes can be implemented by either modifying an existing subroutine or adding a new one. DOE

N92-12344# Pacific Northwest Lab., Richland, WA.
VERTICAL INTEGRATION OF SCIENCE, TECHNOLOGY, AND APPLICATIONS
M. J. Graham Jun. 1990 16 p
(Contract DE-AC06-76RL-01830)
(DE90-013552; PNL-7369) Avail: NTIS HC/MF A03

The Vertical Integration of Science, Technology, and Applications (VISTA) is an initiative developed by the Pacific Northwest Laboratory (PNL) to employ modern information and communications technology for rapid and effective dissemination and use of research results, with emphasis on applying these results to environmental problems. VISTA is being supported at PNL by DOE. The goal of VISTA is to make research results (data, models, and advanced concepts) usable and available to users in the areas of hazardous waste management and global climate change to speed research and development applications and reduce the costs of solving the complex environmental problems facing DOE and the nation. DOE

N92-12345# Central Research Inst. of Electric Power Industry, Tokyo (Japan). Energy and Environment Lab.
DEVELOPMENT OF ATMOSPHERIC DIFFUSION EVALUATION METHOD INCORPORATING THERMAL AND TOPOGRAPHICAL EFFECTS. PART 2: A LITERATURE REVIEW OF TURBULENCE MODEL UNDER TOPOGRAPHICAL CONDITION
Koichi Sada and Yoichi Ichikawa Aug. 1989 42 p In JAPANESE; ENGLISH summary
(DE90-503795; CRIE-T-89005) Avail: NTIS (US Sales Only) HC A03

The development condition of turbulent models which has been introduced until now and their applicability for atmospheric diffusion forecasting was presented in this paper. The turbulent flow diffusion model is required for the forecasting, of which model calculates diffusion utilizing atmospheric turbulence, because atmosphere is the flow field with strong anisotropy. This flow field can be estimated by Mellor-Yamada model. When two equation models (k-epsilon model, etc) based on eddy viscosity concept are used, the method is required, which estimates direction turbulent flow quantity by the result of measurement for turbulence by mean of modification of the model, because the turbulence to be forecasted is isotropic. In order to approximately estimate complicated topography condition, adoption of a general coordinate system is most suitable. It requires establishment of meshes before the calculation is done; however, the linear interpolation method can establish the meshes for various topography and at the same time be applicable for the calculation of atmospheric flow as a practical method. DOE

N92-12346# Central Research Inst. of Electric Power Industry, Tokyo (Japan). Energy and Environment Lab.
OBJECTIVE METHOD FOR ASSESSING MONITORING NETWORKS
Hiroyuki Kato and Sakae Nishinomiya Oct. 1989 44 p In JAPANESE; ENGLISH summary
(DE90-505577; CRIE-T-89007) Avail: NTIS (US Sales Only) HC A03

The efficient atmospheric environment monitoring network was proposed applicable to various meteorological conditions under average emission conditions. The previously reported multivariate analysis method was applied to long interval observational records (emission conditions for three years, SO2 and NO(x) concentrations at existing monitoring stations, and meteorological conditions), by improving some parts of the method for long term data. Through the analysis on a model area, a total optimum network was obtained adaptable to both SO2 and NO(x) measurement, and both monitoring for general atmospheric environment and for stack gas emission of power plants. The network required only 18 stations (17 stations for SO2, 16 for NO(x)) compared with 42 stations in the existing network. The analytical results obtained from continuous data for three years were also equal to the mean values of those obtained from data for each year. DOE

N92-12347# Los Alamos National Lab., NM.
THREE-DIMENSIONAL FORECASTING MODELS ON A DESK-TOP COMPUTER
T. Yamada and S. Bunker 1990 13 p Presented at the ENVIRONSOFT '90: 3rd International Conference, Montreal, Quebec, 11-13 Sep. 1990
(Contract W-7405-eng-36)
(DE90-010612; LA-UR-90-1386; CONF-9009134-1) Avail: NTIS HC/MF A03

Recent advances in the desk-top computer capabilities, particularly those of an engineering workstation, are truly astonishing. A high performance workstation reportedly exceeded a supercomputer in certain scaler operations. Affordability and portability of a desk-top computer opened doors to many applications which were previously considered impossible. The purpose of the present study is to demonstrate the feasibility of using and engineering workstation to operate a three-dimensional mesoscale modeling system to describe the transport and dispersion of atmospheric pollutants over complex terrain surrounding Vandenberg Air Force Base (VAFB), Vandenberg, California. Our modeling system is composed of two numerical codes, HOTMAC and RAPTAD. HOTMAC is a mesoscale forecast code that is able to model three-dimensional distributions of wind speed, wind direction, turbulence, temperature, and water vapor. RAPTAD is a Lagrangian puff code based on the Monte Carlo statistical diffusion process. RAPTAD can be used under extreme conditions where a conventional Gaussian plume model may fail. DOE

N92-12348# Brookhaven National Lab., Upton, NY.
TRANSFORMATION AND DEPOSITION OF ATMOSPHERIC NITROGEN SPECIES: A VIEW FROM THE AQUEOUS SIDE
Yin-Nan Lee Jun. 1990 9 p Presented at the International Conference on Global and Regional Environmental Atmospheric Chemistry, Beijing (China), 3-10 May 1989
(Contract DE-AC02-76CH-00016)
(DE90-013737; BNL-44728; CONF-890525-1) Avail: NTIS HC/MF A02

The Henry's law solubility and reaction kinetics in water are compiled for NO2, PAN, N2O5, HNO2, HNO3, and HNO4. The rate of removal of these species from the atmosphere by cloud droplets and ocean surface water have been evaluated using the chemical and physical properties reported here. The results show that in addition to HNO3 and N2O5, HNO4 is a potentially important species withwhich oxides of nitrogen can be efficiently incorporated into liquid water and removed from the atmosphere. DOE

N92-12349# Oak Ridge National Lab., TN.
MERCURY AS AN ENVIRONMENTAL POLLUTANT
R. R. Turner 28 Jun. 1990 9 p
(Contract DE-AC05-84OR-21400)
(DE90-013392; ORNL/FTR-3648) Avail: NTIS HC/MF A02

The traveler attended the conference, Mercury as an Environmental Pollutant, and presented a technical poster entitled, Biotransformations of Mercury in Contaminated and Control Streams in Relation to the Abundance of Microbial Gene Sequences Encoding Mercury Resistance. Although a great deal of the subject matter of the conference dealt with the biogeochemical cycling of mercury in aquatic and terrestrial systems which have not been subjected directly to industrial pollution, several presentations addressed contamination scenarios similar to those at the Oak Ridge site. These included one presentation concerning application of ion exchange resins in the treatment of mercury-contaminated wastewater and soil, and several concerning the role of mercury-resistant bacteria in biotransformations of mercury at contaminated sites. The Swedish experience with various methods of treating lakes to reduce mercury in fish was the subject of several presentations and one field trip. DOE

N92-12350# Oak Ridge National Lab., TN.
MANAGING GLOBAL CLIMATE CHANGE THROUGH INTERNATIONAL COOPERATION: LESSONS FROM PRIOR RESOURCE MANAGEMENT EFFORTS
D. L. Feldman Jul. 1990 53 p
(Contract DE-AC05-84OR-21400)
(DE90-014699; ORNL/TM-10914) Avail: NTIS HC/MF A04

This report addresses the availability of an incremental and iterative learning process for enhancing international cooperation in the management of global climate change. The process is iterative because carefully formulated agreements are replicated in increasingly larger and diverse contexts. Through an examination of three case studies concerning regional seas, ozone, and nuclear-materials regulation, models for global cooperation are identified that encompass concerns about the size and distribution of correction costs among countries, the uncertainties involved in identifying cause-effect relationships, the vulnerability of shared resources, and the divergent needs of developed and developing countries. The ability of these models to encompass such concerns comes from their emphasis on interactive learning among scientists, environmental groups, international organizations, and governments of nations. DOE

N92-12351# Environmental Health Research and Testing, Inc., Research Triangle Park, NC.
MONITORING IACP SAMPLES AND CONSTRUCTION OF A CENTRALIZED DATABASE
Debra B. Walsh, Dempsey B. Ray, and Jonathan Simonson (ManTech Environmental Technology, Inc., Research Triangle Park, NC.) 1991 13 p
(Contracts EPA-68-DO-0106; EPA-68-02-4456)
(PB91-213546; EPA/600/D-91/122) Avail: NTIS HC/MF A03 CSCL 13B

The Integrated Air Cancer Project (IACP) is a multiyear US EPA research program established to develop and evaluate methods required to identify the principal airborne carcinogens, determine emission sources, and improve the estimate of comparative human cancer risk. The first major field study designed to examine a residential wood combustion airshed was conducted in Boise, Idaho during the 1986-1987 winter heating season. The second major field study conducted in Roanoke, Virginia during the 1988-1989 was to study residential oil heating and wood combustion. Motor vehicle emissions were considered a major combustion product contributor in both airsheds. This paper describes two critical components of the project. The first component is the sample custody and tracking of the samples before analysis. The second component describes the data management of the sample field data (e.g., sample site, time, date, flow rate) as well as the analytical data (e.g., mutagenicity, particle concentrations) for the environmental samples. Author

N92-12352# National Research Council of Canada, Boucherville (Quebec). Industrial Materials Research Inst.
SINGLE-COLUMN ION CHROMATOGRAPHY OF PASSIVE MONITORS FOR ATMOSPHERIC POLLUTION
Denis Noel, Helene Roberge, and Jean-Jacques Hechler 1988 34 p
(NRC-28893; NRC-IGM88AP-202-712-G; CTN-91-60302)
Copyright Avail: NTIS HC/MF A03

In 1984, a joint US-Canadian atmospheric corrosion program was started in order to evaluate the extent of corrosion of common metals in different environments. Atmospheric pollutants such as SO(x) and NO(x) are known to be corrosive to metals. Corrosion damage from these pollutants is related much more strongly to their deposition velocity than to atmospheric concentrations. In the work described here, nitrite, nitrate, and sulfate anions were collected on passive deposition monitors. Sulfation and nitration plates were exposed outdoors for various periods in an atmosphere with a low degree of pollution to evaluate the rate of deposition of these corrosive species. Single column ion chromatography, turbidimetry, and colorimetry were compared as analytical methods. It was shown that turbidimetry was inappropriate for sulfate concentrations lower than 2.5 mg/plate. Ion chromatography was able to determine sulfate levels as low as 200 micrograms/plate without preconcentration. For the nitrate plates, ion chromatography permitted the determination of nitrite, nitrate, and sulfate from the same plate, whereas only nitrite could be determined by colorimetry. Gluconate-borate and phthalate eluents were investigated and the results indicate that the phthalate eluent performs better for quantitative analysis of the plates. The pH of the sample had an important effect on the sulfate peak area with area increasing when the pH was below 6. Thus, adequate sample treatment before injection is important in order to obtain reproducible and accurate results. Author (CISTI)

N92-12353# Resources for the Future, Inc., Washington, DC.
PROCESSES FOR IDENTIFYING REGIONAL INFLUENCES OF AND RESPONSES TO INCREASING ATMOSPHERIC CO2 AND CLIMATE CHANGE: THE MINK PROJECT
J. Darmstadter Aug. 1991 60 p
(Contract DE-AC06-76RL-01830)
(DE91-018606; DOE/RL-01830T-H11) Avail: NTIS HC/MF A04

This is the fifth of a series of reports of research contributing to the study Processes for Identifying Regional Influences of and Responses to Increasing Atmospheric CO2 and Climate Change -- The MINK Project. This report is directed to an analysis of the possible impacts of climatic change on energy in the Missouri-Iowa-Nebraska-Kansas (MINK) region. It follows a uniform methodological strategy that is applied to the four resource sectors most likely to be impacted by climate change, i.e., agriculture, forestry, water resources and energy. The methodological strategy is fully explained in Report 1 of this series. DOE

N92-12354# Resources for the Future, Inc., Washington, DC.
PROCESSES FOR IDENTIFYING REGIONAL INFLUENCES OF AND RESPONSES TO INCREASING ATMOSPHERIC CO2 AND CLIMATE CHANGE: THE MINK PROJECT
M. D. Bowes and P. R. Crosson Aug. 1991 58 p
(Contract DE-AC06-76RL-01830)
(DE91-018607; DOE/RL-01830T-H12) Avail: NTIS HC/MF A04

This is the sixth of a series of reports of research contributing to the study Processes for Identifying Regional Influences of and Responses to Increasing Atmospheric CO2 and Climate Change -- The MINK Project. This report is directed to providing an integrated analysis of the possible economic impacts of climatic change on resources in the Missouri-Iowa-Nebraska-Kansas (MINK) region. It is based on a uniform methodological strategy that was applied to the four resource sectors most likely to be impacted by climate change, i.e., agriculture, forestry, water resources and energy. The methodological strategy is fully explained in Report 1 of this series. DOE

N92-12355# Resources for the Future, Inc., Washington, DC.
PROCESSES FOR IDENTIFYING REGIONAL INFLUENCES OF AND RESPONSES TO INCREASING ATMOSPHERIC CO2 AND CLIMATE CHANGE: THE MINK PROJECT
N. J. Rosenberg and P. R. Crosson Aug. 1991 35 p
(Contract DE-AC06-76RL-01830)
(DE91-018608; DOE/RL-01830T-H13) Avail: NTIS HC/MF A03

This overview report explains the rationale for and the methodology used in conduct of the study Processes for Identifying Regional Influences of and Responses to Increasing Atmospheric CO2 and Climate Change -- The MINK Project, commissioned by the U.S. Department of Energy. The MINK project includes four states -- Missouri, Iowa, Nebraska and Kansas. The major findings of the study are also presented in this overview, which accompanies a series of reports in which the requisite technical details on methodology, sectoral analyses and integrated analysis of climate change impacts and responses are provided in detail. The report topics in this analysis series of potential greenhouse effects are: (1) background and baseline; (2) agricultural production and resource use in the MINK region without and with climate change; (3) a farm-level simulation of the effects of climate change on crop productivity in the MINK region; (4) forest resources; (5) water resources; (6) energy; (7) consequences of climate change for the MINK economy: impacts and responses. DOE

N92-12356# Oak Ridge National Lab., TN.
CAN SULFATE FLUXES IN FOREST CANOPY THROUGHFALL BE USED TO ESTIMATE ATMOSPHERIC SULFUR DEPOSITION?
S. E. Lindberg, C. T. Garten, Jr., J. N. Cape, and W. Ivens 1991 11 p Presented at the 5th International Conference on Precipitation Scavenging and Atmosphere Surface Exchange Process, Richland, WA, 15-19 Jul. 1991
(Contract DE-AC05-84OR-21400)
(DE92-000044; CONF-9107104-15) Avail: NTIS HC/MF A03

The flux of sulfate is forest throughfall and stemflow (the sum of which is designated here as TF) may be an indicator of the atmospheric deposition of S, particularly if foliar leaching of internal plant S is small relative to washoff of deposition. Extensive data from 13 forests indicate that annual sulfate fluxes in TF and in atmospheric deposition are very similar, and recent studies with S-35 tracers indicate that leaching is only a few percent of total TF. However, some short term deposition/TF comparisons show large differences, and there remain questions about interpretation of tracer results. Considering the data, we conclude that TF may be used under some conditions to estimate deposition within acceptable uncertainty limits, but that some assumptions need further testing. If TF does reflect deposition, these data suggest that commonly used methods and models seriously underestimate total S deposition at some sites. DOE

N92-12357# Los Alamos National Lab., NM.
RECENT TRENDS IN WASTE-REDUCTION EFFORTS IN THE US MANUFACTURING SECTOR
K. S. Tsuji 1991 9 p Presented at the 1st International Congress on Environmentally Conscious Manufacturing, Santa Fe, NM, 18 Sep. 1991
(Contract W-7405-eng-36)
(DE92-000197; LA-UR-91-3028; CONF-9109259-6) Avail: NTIS HC/MF A02

Recent trends in pollution-control by the U.S. manufacturing sector reveal that a multitude of in process measures are taken to generate less waste rather than treating it afterwards. The measures utilized are highly variable across sectors. Sectors that produce the largest shares of waste and spend the greatest proportion of capital outlays on pollution abatement are the most commonly reported as being involved in pursuing waste-reduction. Despite advances in waste-reduction efforts, expenditures are still mostly for end-of-pipe measures. DOE

46 GEOPHYSICS

Includes aeronomy; upper and lower atmosphere studies; ionospheric and magnetospheric physics; and geomagnetism.

For space radiation see *93 Space Radiation.*

N92-12358# EG and G Energy Measurements, Inc., Los Alamos, NM.
WORKSHOP ON ARTIFICIALLY IONIZED LAYERS IN THE ATMOSPHERE Trip Report
T. W. Tunnell 30 Oct. 1989 7 p Workshop held in Kiev, USSR, Oct. 1989
(Contract DE-AC08-88NV-10617)
(DE90-013470; EGG-10617-7002; LAO-2732-1856) Avail: NTIS HC/MF A02

I presented our report which described our technique of inferring electron temperature in a microwave induced plasma. The primary purpose of my trip to Kiev was to present a paper entitled, Analysis of Nitrogen Light Emission from Artificially Ionized Layers (AIL) Breakdown, at the AIL workshop. The AIL concept is to produce an ionized layer in the atmosphere from which radio frequency waves can be reflected. The workshop provided for the transfer of unclassified technology between the US and the USSR, who are reportedly years, if not decades, ahead of the US in this area of research. DOE

N92-12359# Florida Univ., Gainesville. Dept. of Physics.
CONSISTENCY CONDITIONS AND REPRESENTATIONS OF A q-DEFORMED VIRASORO ALGEBRA
A. P. Polychronakos 1990 12 p
(Contract DE-FG05-86ER-40272)
(DE90-013715; DOE/ER-40272/103; UFIFT-HEP-90-14) Avail: NTIS HC/MF A03

We derive deformations of the Virasoro algebra in terms of diffeomorphisms of functions on a discretized circle. The Curtright-Zachos deformation is recovered in one case, for a root deformation parameter of unity. Consistency conditions are then derived for this algebra by introducing the so-called braid-Jacobi identities. All the representations are subsequently found through use of these identities. Furthermore, it is shown that no nontrivial central term can be incorporated, since it clashes with the consistency conditions. Finally, an alternative deformation is derived which generalizes the Drinfeld deformation of the Su(1,1) subgroup to the full algebra. DOE

N92-12360*# Alabama Univ., Huntsville.
CHEMICAL RELEASE AND RADIATION EFFECTS EXPERIMENT ADVANCED PLANNED Final Technical Report, 19 May 1989 - 19 May 1990
William W. Vaughan and Melanie Alzmann May 1990 46 p
(Contract NAS8-36955)
(NASA-CR-184229; NAS 1.26:184229; TR-5-32156) Avail: NTIS HC/MF A03 CSCL 04A

A summary of the efforts conducted to provide assessments and planning support for the Chemical Release and Radiation Experiment Satellite (CRRES) is reported. Included are activities regarding scientific working group and workshop development including the preparation of descriptive information on the CRRES project. Author

N92-12361# Provence Univ., Marseille (France). Equipe Collisions Ions Molecules.
MEASUREMENT OF CHARGE EXCHANGE REACTION CONSTANTS BOTH AT EQUILIBRIUM AND OUT OF EQUILIBRIUM IN A PAUL TRAP Final Report [MESURE DE CONSTANTES DE REACTIONS D'ECHANGE DE CHARGE A L'EQUILIBRE ET HORS D'EQUILIBRE DANS UN PIEGE DE PAUL. RAPPORT FINAL]
Fernande Vedel and Michel Vedel Mar. 1991 14 p In FRENCH
(Contract DRET-89-174)
(ETN-91-90103) Avail: NTIS HC/MF A03

An ion trap for quadrupolar ions (a Paul trap) is used to measure reaction constants in conditions similar to those of physics in the upper atmosphere. The energy of the ions caught in the trap is calibrated. The first step of the calibration involves systematic detection of N(+) ions. The research is part of a program developing relaxation models downstream from a shock wave. The constants from the reactions measured can be used directly in numeric codes developed at the Department of Environments out of equilibrium. ESA

N92-12362*# Alabama Univ., Huntsville.
COMBINED RELEASE AND RADIATION EFFECTS SATELLITE (CRRES) EXPERIMENT: EDUCATIONAL PLANNING AND COORDINATION Final Technical Report, 14 Feb. - 30 Sep. 1991
William W. Vaughan and Melanie Alzmann 30 Sep. 1991 39 p
(Contract NAS8-36955)
(NASA-CR-184255; NAS 1.26:184255; UAH-TR-5-32586/5-32588) Avail: NTIS HC/MF A03 CSCL 04A

The efforts conducted to provide educational planning and development support for the Combined Release and Radiation Satellite (CRRES) Experiment are summarized. Activities regarding the scientific working group and workshop development are presented including the preparation of descriptive information on the CRRES Project. Author

N92-12363# Norwegian Defence Research Establishment, Kjeller.
COMPARISON OF SOME DIFFERENT FORMULAE FOR GROUND SHOCK PREDICTION [SAMMENLIKNING AV NOEN FORMLER FOR GRUNNSJOKK]
Svein Rollvik and Henrik Sjoel 15 May 1991 22 p In NORWEGIAN; ENGLISH summary
(FFI-90/4006; ISSN-0802-2437; ETN-91-90255) Avail: NTIS HC/MF A03

In connection with a minor revision of the Norwegian Fortification handbook some different formulae for ground shock predictions are compared. The formulae predict very different values for the strength of the ground shock. The difference can partly be explained by a more detailed consideration of the two different propagation modes of the ground shock. The pulse propagates as a Rayleigh wave close to the surface and as an ordinary compression and shear wave at time distance from the surface. The Rayleigh wave extends deeper into the ground in rock than it does in soil. For that reason it is recommended to use different formulae for ground shock in rock and in soil. The remaining uncertainty in the predicted ground shock strength is mainly caused by the natural variation in geological conditions at different sites. The great uncertainty in the ground shock formulae has generally led to an overprediction of the shock strength and to unnecessarily expensive requirements for ground shock protection. More realistic and less expensive ground shock protection requirements were obtained as a result of this study. ESA

N92-12364 Max-Planck-Inst. fuer Physik und Astrophysik, Garching (Germany, F.R.).
GENERATION OF AURORAL KILOMETRIC RADIATION IN UPPER HYBRID WAVE-LOWER HYBRID SOLITON INTERACTION
R. Pottelette, R. A. Treumann, and N. Dubouloz (Centre de Recherches en Physique de l'Environnement, Saint Maur des Fosses, France) May 1991 34 p Submitted for publication
(MPE-Preprint-202; ETN-91-90314) Copyright Avail: Max-Planck Inst. fuer Physik und Astrophysik, 8046 Garching, Fed. Republic of Germany

Sporadic Auroral Kilometric Radiation (AKR) bursts associated with strong bursty electrostatic turbulence in the vincinity of the lower hybrid frequency are often recorded by the Viking satellite in the AKR source region. The time scale of these wave emissions is typically 1 s. This time is long enough for the lower hybrid waves to grow to amplitudes of several hundred mV/m. Based on these observations it is suggested that formation of lower hybrid solitons plays a crucial role in the complex plasma processes

leading to the generation of AKR. A theoretical model for this process which is based on the nonlinear interaction between lower hybrid solitons and upper hybrid waves is proposed. ESA

N92-12365# Oak Ridge National Lab., TN.
A STANDARD TEST SET FOR NUMERICAL APPROXIMATIONS TO THE SHALLOW WATER EQUATIONS IN SPHERICAL GEOMETRY
D. L. Williamson, J. J. Hack, R. Jakob, P. N. Swarztrauber, and J. B. Drake Aug. 1991 29 p
(Contract DE-AC05-84OR-21400)
(DE92-000385; ORNL/TM-11895) Avail: NTIS HC/MF A03

A suite of seven test cases is proposed for the evaluation of numerical methods intended for the solution of the shallow water equations in spherical geometry. The shallow water equations exhibit the major difficulties associated with the horizontal dynamical aspects of atmospheric modeling on the spherical earth. These cases are designed for use in the evaluation of numerical methods proposed for climate modeling and to identify the potential trade-offs which must always be made in numerical modeling. Before a proposed scheme is applied to a full baroclinic atmospheric model it must perform well on these problems in comparison with other currently accepted numerical methods. The cases are presented in order of complexity. They consist of advection across the poles, steady state geostrophically balanced flow of both global and local scales, forced nonlinear advection of an isolated low, zonal flow impinging on an isolated mountain, Rossby-Haurwitz waves, and observed atmospheric states. One of the cases is also identified as a computer performance/algorithm efficiency benchmark for assessing the performance of algorithms adapted to massively parallel computers. DOE

N92-12931*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, CA.
FRACTIONATION OF TERRESTRIAL NEON BY HYDRODYNAMIC HYDROGEN ESCAPE FROM ANCIENT STEAM ATMOSPHERES Abstract Only
K. Zahnle *In* Lunar and Planetary Inst., Abstracts for the 54th Annual Meeting of the Meteoritical Society 1991 p 259 (For primary document see N92-12901 03-90)
Avail: NTIS HC/MF A14 CSCL 03B

47 METEOROLOGY AND CLIMATOLOGY

Includes weather forecasting and modification.

N92-12366*# Scientific Analysis and Modelling, New Carrollton, MD.
INTERPRETING MEASUREMENTS OBTAINED WITH THE CLOUD ABSORPTION RADIOMETER Final Report
24 Oct. 1988 78 p
(Contract NAS5-30136)
(NASA-CR-189241; NAS 1.26:189241) Avail: NTIS HC/MF A05 CSCL 04B

The software developed for the analysis of data from the Cloud Absorption Radiometer (CAR) is discussed. The CAR is a multichannel radiometer designed to measure the radiation field in the middle of an optically thick cloud (the diffusion domain). It can also measure the surface albedo and escape function. The instrument currently flies on a C-131A aircraft operated by the University of Washington. Most of this data was collected during the First International satellite cloud climatology project Regional Experiment (FIRE) Marine Stratocumulus Intensive Field Observation program off San Diego during July 1987. Earlier flights of the CAR have also been studied. Author

N92-12367# Atmospheric and Environmental Research, Inc., Cambridge, MA.
SIMULATING CLIMATE WITH TWO DIFFERENT NUMERICAL SCHEMES
William J. Gutowski, Michael J. Iacono, Xin-Zhong Liang, and Wei-Chyung Wang Jun. 1990 57 p
(Contract DE-FG02-86ER-60422)
(DE90-011777; DOE/ER-0459T) Avail: NTIS HC/MF A04

We compare climate simulations from two models that are identical except that one uses gridpoint techniques and the other spectral techniques for the numerical treatment of atmospheric dynamics. Our purpose is not to determine which technique is better but to indicate the dependence of climate simulation on model numerics. Simulations of a perpetual July are performed using spectral and gridpoint dynamics codes coupled to the Oregon State University model's two-layer atmospheric physics. DOE

N92-12368# Oak Ridge National Lab., TN.
ON THE VULNERABILITY OF ELECTRIC POWER TO GEOMAGNETIC STORMS
P. R. Barnes and J. W. VanDyke May 1990 8 p Presented at the IEEE/PES 1990 Summer Meeting, Minneapolis, MN, 15-20 Jul. 1990
(Contract DE-AC05-84OR-21400)
(DE90-013929; CONF-900773-3) Avail: NTIS HC/MF A02

Geomagnetic storms associated with sunspot and solar flare activity can disturb communications and disrupt electric power. A severe geomagnetic storm could cause a major blackout with an economic impact of several billion dollars. The vulnerability of electric power systems in the northeast United States will likely increase during the 1990's due to the trend of wheeling large amounts of power over long distances to meet the electricity demands of this region. A comprehensive research program and a warning satellite to monitor the solar wind are needed to enhance the reliability of electric power systems under the influence of geomagnetic storms. DOE

N92-12369# Colorado State Univ., Fort Collins. Dept. of Atmospheric Science.
CLOUD PARAMETERIZATION FOR CLIMATE MODELS
D. A. Randall Aug. 1990 36 p Presented at the Beijing International Symposium on Climate Change, Beijing (China), 9-12 Aug. 1990
(Contract DE-FG02-89ER-69027)
(DE90-014344; CONF-9008126-2) Avail: NTIS HC/MF A03

This paper presents a review of the problem of cloud parameterization for climate models, with equal attention to the radiative, convective, and latent effects of the clouds. The Colorado State University General Circulation Model is used as an illustrative example. The radiative effects are highly variable, depending on the cloud morphology and the level at which the cloud occurs. Microphysical effects may also be important. Small scale mass circulations associated with clouds are of great importance for vertical energy transports, and also for carrying moisture to the middle and upper troposphere. Condensation and evaporation associated with clouds are due to both cumulus convection and large scale saturation. These two processes are intimately linked, especially for upper tropospheric clouds. DOE

N92-12370# Colorado State Univ., Fort Collins. Dept. of Atmospheric Science.
NUMERICAL STUDIES OF THE ROLE OF CLOUDS IN THE PRESENT CLIMATE
D. A. Randall Aug. 1990 13 p Presented at the Beijing International Symposium on Climate Change, Beijing (China), 9-12 Aug. 1990
(Contract DE-FG02-89ER-69027)
(DE90-014345; CONF-9008126-1) Avail: NTIS HC/MF A03

Until recently there has been lingering skepticism, in the general circulation modeling community, that the radiative effects of clouds significantly influence the atmospheric general circulation. Zonally uniform observed cloud amounts were, in some cases, prescribed by modelers who preferred to avoid confronting the complex physics of cloud formation. Ironically, GCMs have provided the proof that the radiative effects of clouds are important for the general circulation of the atmosphere. An important concept in analysis of the effects of clouds on climate is the cloud radiative forcing, which is defined as the difference between the radiative

flux which actually occurs in the presence of clouds, and that which would occur if the clouds were removed but the atmospheric state were otherwise unchanged. We also use the term CRF to denote warming or cooling tendencies due to cloud-radiation interactions. Cloud feedback is the change in CRF that accompanies a climate change. It is useful to distinguish among three aspects of the CRF: the planetary CRF acting at the top of the atmosphere, the surface CRF at the Earth's surface, and the atmospheric CRF, which acts on the atmospheric itself and is the difference between the planetary and surface CRFs. This paper reviews the magnitudes, distribution causes, and consequences of the CRF, as they relate to climate modeling. A review of some earlier studies is combined with a brief presentation of new, previously unpublished results. DOE

N92-12371# National Oceanic and Atmospheric Administration, Idaho Falls, ID. Environmental Research Labs.
CLIMATE MONITORING AND DIAGNOSTICS LABORATORY NO. 18 Summary Report, 1989
Walter D. Komhyr, ed. and Rita M. Rosson, ed. Dec. 1990 151 p
(PB91-205559) Avail: NTIS HC/MF A08 CSCL 04B

Observatory reports from the South Pole Observatory, Mauna Loa Observatory, Barrow Observatory, American Samoa, Rockville, and Cape Grim stations are presented. Additionally, reports are presented by the following groups: the Aerosols and Radiation Monitoring group, the Carbon Cycle group, the Ozone group, Acquisition and Data Management, the Air Quality group, and the Nitrous Oxide and Halocarbons group. The section marked the Director's Office includes reports on a joint US/USSR experiment for the study of desert dust, an annual ozone cycle and decade trend study at the South Pole, and a wintertime black carbon aerosol measurement over the southwestern United States. GRA

N92-12372# National Research Council of Canada, Ottawa (Ontario). Applied Aerodynamics Lab.
KAPUSKASING FIELD STUDY RELATING ATMOSPHERIC STABILITY TO WIND DRIFT FROM AERIAL FOREST SPRAY OPERATIONS
R. S. Crabbe and M. McCooeye Aug. 1989 30 p Original contains color illustrations
(NRC-LTR-UA-99; CTN-91-60224) Copyright Avail: NTIS HC/MF A03

To delineate the effects of atmospheric stability on windborne drift from ultra-low volume (ULV) forest aerial spray operations, a two-year field study was undertaken in northern Ontario. The experimental protocol was designed to have as little variation as possible in the uncontrollable parameters, such as wind direction, wind speed and relative humidity; however, the droplet size spectrum was varied to reflect a range of operational practices commonly observed in insecticide applications to forests. The drift from 13 aerial releases in a wide range of atmospheric conditions was analyzed to comprise the data set. Based on drift measurements, the results of this investigation clearly demonstrate that neutral to unstable (turbulent conditions) can often reduce off-target drift relative to stable conditions. This conclusion is particularly relevant to ULV aerial applications; however, it also applies to any pesticide spray application where droplets smaller than 100 microns diameter are present. Neutral to unstable conditions occur between two hours or so after sunrise and two hours or so before sunset; however, since the inversion base has a characteristic rate of rise following sunrise (50-100 meters per hour) forest pesticide applicators should fly their spray lines in the morning turbulent mixing layer beneath a low, well defined capping inversion to reduce off-target drift. The height of the inversion may be determined from a vertical temperature profile. CISTI

N92-12373# Toronto Univ. (Ontario). Inst. for Aerospace Studies.
THE MODELLING OF TURBULENCE AND DOWNBURSTS FOR FLIGHT SIMULATORS
Paul Aaron Robinson Jan. 1991 391 p
(UTIAS-339; ISSN-0082-5255; CTN-91-60269) Avail: NTIS HC/MF A17

This study investigates the degree of complexity required in the simulation of turbulence and thunderstorm downburst wind shear for flight simulation. A turbulence model is presented which contains all the correlations found in homogeneous isotropic turbulence. As part of the development of this turbulence model a method is introduced by which a time series may be modulated to alter its statistical properties while not affecting its spectral properties. Several simplifications and alternate models are considered. This report also presents further developments in the simulation of thunderstorm downbursts. A single ring vortex system, a triple ring vortex system, and joint airport weather studies (JAWS) data are implemented on the University of Toronto, Institute for Aerospace Studies (UTIAS) B-747 Flight Simulator. By means of pilot evaluations on this simulator, it was found that the inclusion of the isotropic turbulence correlations did not seem to affect the pilots' performance or aircraft response. Overall, spectral methods were favored as a means of generating turbulence for flight simulation. Pilot evaluations of the downburst models showed that both single and triple ring vortex systems produced similar pilot reactions to the actual downbursts (JAWS data). It is suggested that the ring vortex models be expanded upon to include more than one downburst cell. Author (CISTI)

N92-12374 Royal Netherlands Meteorological Inst., De Bilt.
STORM CALENDAR 1964-1990: CHRONOLOGICAL SURVEY OF ALL STORMS (WIND FORCE 8 AND HIGHER) ALONG THE DUTCH COAST IN THE PERIOD 1964-1990 [STORMENKALENDAR 1964-1990: CHRONOLOGISCH OVERZICHT VAN ALLE STORMEN (WINDKRACHT 8 EN HOGER) LANGS DE NEDERLANDSE KUST VOOR HET TIJDVAK 1964-1990]
B. Augustijn, H. Daan, B. vanMourik, D. Messerschmidt, and B. Zwart 1990 141 p In DUTCH
(KNMI-176; UDC-551.553.8; ETN-91-90010) Copyright Avail: Royal Netherlands Meteorological Inst., P.O. Box 201, 3730 AE De Bilt, Wilhelminalaan 10, Netherlands

Data concerning strong winds and storms on the Dutch coast (1964-1990) are considered. Compared to the technical report published in 1984, the data have been completed and revised. The revision concerns the criteria for the wind force and the Beaufort scale. For each storm peak the main wind direction is indicated. Concise statistics of storms are given. The data are based on observations made from meteorological stations which are also used for verification of wind and storm warning services. ESA

N92-12375*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, AL.
ATMOSPHERIC ENVIRONMENT FOR SPACE SHUTTLE (STS-37) LAUNCH
G. L. Jasper and G. W. Batts (New Technology, Inc., Huntsville, AL.) Nov. 1991 46 p
(NASA-TM-103556; NAS 1.15:103556) Avail: NTIS HC/MF A03 CSCL 04B

A summary of selected atmospheric conditions observed near Space Shuttle STS-37 launch time on 5 Apr. 1991 at KSC is presented. Values of ambient pressure, temperature, moisture, ground winds, visual observations (clouds), and winds aloft are included. The sequence of prelaunch Jimsphere-measured vertical wind profiles is given. The final atmospheric tape, which consists of wind and thermodynamic parameters versus altitude, for STS-37 vehicle ascent was constructed. The STS-37 ascent atmospheric data tape was constructed by Marshall Space Flight Center's Earth Science and Applications Division to provide an internally consistent data set for use in postflight performance assessments and represents the best estimate of the launch environment to the 400,000 ft. altitude that was traversed by the STS-37 vehicle. Author

N92-12376# Colorado State Univ., Fort Collins. Dept. of Atmospheric Science.
SUMMARY OF 1991 ATLANTIC TROPICAL CYCLONE ACTIVITY AND SEASONAL FORECAST VERIFICATION: A YEAR OF NO HURRICANES IN THE TROPICS BUT AN UNUSUALLY LARGE NUMBER OF HIGHER LATITUDE BAROCLINICALLY INFLUENCED TROPICAL CYCLONE SYSTEMS
William M. Gray 25 Nov. 1991 18 p
Avail: NTIS HC/MF A03

The tropical cyclone (TC) activity is summarized which occurred in the Atlantic Basin during 1991, and the seasonal forecast of such activity that was issued in early June was verified, and was updated on 2 August before the start of the active part of the hurricane season. Data received indicated that the Atlantic should experience a below average season with about 4 hurricanes, 8 named storms of hurricane and tropical storm intensity, 15 hurricane days, 35 named storm days, and one intense hurricane of Saffir/Simpson category 3-4-5. The 2 Aug. updated forecast, using data of below average amounts of June-July Western Sahel rainfall, positive June-July Caribbean basin surface pressure and upper level zonal wind anomalies led to the reduction of the forecast number of hurricanes to 3, named storms to 7, and of hurricane days to 10. The actual number of hurricanes in 1991 was 4; the number of named storms was 8. There were 2 intense or category 3 hurricanes which formed at high latitude and were short lived as intense systems. The key to this very inactive season was the lack of developing African wave systems. Except for the 2 high latitude intense hurricanes, the forecast verified quite well.
Author

N92-12377# Colorado State Univ., Fort Collins. Dept. of Atmospheric Science.
EXTENDED RANGE FORECAST OF ATLANTIC SEASONAL HURRICANE ACTIVITY FOR 1992
William M. Gray 26 Nov. 1991 11 p
Avail: NTIS HC/MF A03

Details are presented of a 6 to 11 month extended range seasonal forecast of the tropical cyclone activity that might be expected to occur in the Atlantic Ocean basin during 1992. This forecast is based on new research which allows an estimate of the amount of next season's Atlantic tropical cyclone activity to be made by the end of the Quasi-Biennial Oscillation (QBO) of equatorial stratospheric zonal wind and of two measures of West African rainfall through late November. Information up to late Nov. 1991, indicates that the 1992 Atlantic hurricane activity will likely be below average with about 4 hurricanes, 8 named storms, 15 hurricane days, and 1 relatively short lived intense hurricane. Although the 1992 season should be more active than the 1991 season has been, it should be less active than have the recent seasons of 1988 to 1990. The probability of hurricane destruction along the US East Coast and within the Caribbean basin for 1991 is projected to be below average. It is expected that the long running West Sahel drought will continue through next season and that lingering influences of the current El Nino event will both be suppressing influences for next season's activity. Author

N92-12378# Beleidscommissie Remote Sensing, Delft (Netherlands).
VIERS-1, PART 2: COMPLETION OF THE LABORATORY EXPERIMENTS Progress Report
C. J. Calkoen, D. vanHalsema, Bernd Jaehne, J. A. M. Janssen, W. A. Oost, P. Snoeij, and J. Vogelzang (Rijkswaterstaat, Rijswijk, Netherlands) 11 Jun. 1991 154 p
(Grant EEC-ST2J-0451-C(GDF))
(BCRS-90-27; ETN-91-90305) Avail: NTIS HC/MF A08

This report is a sequel to the progress report on the VIERS-1 project, part 1: the Delft experiement. The institution of a modeling group to translate new insights in the relation between microwave backscatter, wave field and wind into a computer model is described. The normalized radar cross section is calculated as a function of the wave field and a number of atmospheric properties (primarily the wind field). To be applicable to the interpretation of ERS-1 data, the model is inverted to calculate the wind from sets of radar cross sections. For individual titles, see N92-12379 through N92-12380.

N92-12379# Scripps Institution of Oceanography, La Jolla, CA. Physical Oceanography Research Div.
TWO-DIMENSIONAL WAVE NUMBER SPECTRA OF SMALL-SCALE WATER SURFACE WAVES
Bernd Jaehne and Klaus S. Riemer (Heidelberg Univ., Germany, F.R.) *In* Beleidscommissie Remote Sensing, VIERS-1, Part 2: Completion of the Laboratory Experiments 11 Jun. 1991 p 58-77 Sponsored by State of Baden-Wuerttemberg, and German Science Foundation (For primary document see N92-12378 03-47)
Avail: NTIS HC/MF A08

Two dimensional wave slope spectra are measured in the large Delft wind wave facility using an imaging optical technique and digital image processing. The data cover wavelengths from 0.4 to 24 cm and wind speeds (U sub 10) from 2.7 to 17.2/meters per second. The spectral densities of small gravity waves at higher wind speeds are proportional to K/3.5 power and u sub *. Capillary gravity and capillary waves show features which clearly manifest that the energy balance for these waves is much different from that for gravity waves. The degree of saturation is approximately constant at a given wind speed, but strongly increases with friction velocity. A sharp cut off, which is almost independent of the wind speed, occurs at a wavelength of about 7mm. ESA

N92-12380# Royal Netherlands Meteorological Inst., De Bilt.
THE WIND PROFILE IN A WAVE FLUME
W. A. Oost *In* Beleidscommissie Remote Sensing, VIERS-1, Part 2: Completion of the Laboratory Experiments 11 Jun. 1991 p 79-88 (For primary document see N92-12378 03-47)
Avail: NTIS HC/MF A08

Results of a program aimed at an improved understanding of the processes involved in the measurement of wind from space by radar scatterometry are presented. The scatterometer on board the European Remote Sensing Satellite (ERS-1) is used for this research. An algorithm used in interpreting the scatterometer data is described. A problem run into in a second experiment taking place in the Delta flume of Delft hydraulics is described. This large facility is used to study the influence of large waves on the radar reflective properties of the water surface. Life size waves are needed for this research. ESA

48 OCEANOGRAPHY

Includes biological, dynamic, and physical oceanography; and marine resources.

For related information see also *43 Earth Resources and Remote Sensing.*

N92-12381# Brookhaven National Lab., Upton, NY.
CONCLUDING REMARKS: PROMISES AND LIMITATIONS OF INDIVIDUAL CELL AND PARTICLE ANALYSIS
Paul G. Falkowski, Serge Demers, and Louis Legendre (Laval Univ., Quebec) 1990 10 p Presented at the NATO Advanced Study Institute on Individual Cell and Particle Analysis in Oceanography, Acquafredda di Maratea (Italy), 21-30 Oct. 1990
(Contract DE-AC02-76CH-00016)
(DE91-016900; BNL-46428; CONF-9010397-1) Avail: NTIS HC/MF A02

At the present time, there are two philosophical schools of thought addressing the major research questions in biological oceanography. Up to now, biogeochemists have been attempting to scale up shipboard or in situ measurements, using either satellite images and/or large circulation models, in order to assess to importance of specific processes to global geochemical cycles. On the other hand, a large number of biologists (and some chemists) are concerned with describing the structure of biological or particle assemblages, and relating these structures to the physical and chemical characteristics of the environment. While

biogeochemists and community biologists share some common goals, their approaches differ markedly. We propose to partake, here, our thoughts about the present and potential roles of individual cell and particle analysis in oceanography, and give our opinions about the promises and limitations of this type of analyses in aquatic sciences. Our comments will mainly address biological issues. DOE

N92-12382# National Ocean Service, Anchorage, AK. Arctic Environmental Assessment Center.
OUTER CONTINENTAL SHELF ENVIRONMENTAL ASSESSMENT PROGRAM. VOLUME 73: FINAL REPORTS OF PRINCIPAL INVESTIGATORS
May 1991 453 p Sponsored by Minerals Management Service
(PB91-204917; OCS/MMS-91/0035-Vol-73) Avail: NTIS HC/MF A20 CSCL 08C

Three reports are presented in this volume: (1) Subsea permafrost -- probing, thermal regime, and data analyses, 1975-1981; (2) A geographic based information management system for permafrost prediction in the Beaufort and Chukchi seas -- Part 1, Submarine permafrost on the Alaskan shelf; and (3) A geographic based information management system for permafrost prediction in the Beaufort and Chukchi seas -- Part 2, Submarine permafrost on the Arctic shelf of Eurasia and the development of the Arctic in the Pleistocene. Each paper is in reference to offshore drilling of oil and gas. GRA

N92-12383# Scripps Institution of Oceanography, La Jolla, CA.
[AUTONOMOUS OCEAN PROFILER] Annual Report, Apr. 1990 - May 1991
Russ Davis 1991 11 p
(Contract N00014-89-C-6014)
(AD-A239800; AD-E040117; NOARL-CR-033-91) Avail: NTIS HC/MF A03 CSCL 08/3

The autonomous ocean profiler is a vertically cycling instrument for gathering ocean profile data over long periods of time and relaying it through the Argos satellite system which also locates the buoys. The objective of the present program is to develop a profiler capable of reporting sound speed profiles with an accuracy of 0.25 m/s over many months of operation and 50 vertical cycles. It is based on the Autonomous Lagrangian Circulation Explorer (ALACE) float which is an uninstrumented float used to measure subsurface currents through observed displacement between successive surfacing. GRA

N92-12384*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
A PACIFIC OCEAN GENERAL CIRCULATION MODEL FOR SATELLITE DATA ASSIMILATION
Y. Chao, D. Halpern, and C. R. Mechoso (California Univ., Los Angeles.) Feb. 1991 39 p
(Contract NAS7-918)
(NASA-CR-189447; JPL-Publ-91-9; NAS 1.26:189447) Avail: NTIS HC/MF A03 CSCL 08C

A tropical Pacific Ocean General Circulation Model (OGCM) to be used in satellite data assimilation studies is described. The transfer of the OGCM from a CYBER-205 at NOAA's Geophysical Fluid Dynamics Laboratory to a CRAY-2 at NASA's Ames Research Center is documented. Two 3-year model integrations from identical initial conditions but performed on those two computers are compared. The model simulations are very similar to each other, as expected, but the simulations performed with the higher-precision CRAY-2 is smoother than that with the lower-precision CYBER-205. The CYBER-205 and CRAY-2 use 32 and 64-bit mantissa arithmetic, respectively. The major features of the oceanic circulation in the tropical Pacific, namely the North Equatorial Current, the North Equatorial Countercurrent, the South Equatorial Current, and the Equatorial Undercurrent, are realistically produced and their seasonal cycles are described. The OGCM provides a powerful tool for study of tropical oceans and for the assimilation of satellite altimetry data. Author

N92-12385*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
AN ATLAS OF MONTHLY MEAN DISTRIBUTIONS OF GEOSAT SEA SURFACE HEIGHT, SSMI SURFACE WIND SPEED, AVHRR/2 SEA SURFACE TEMPERATURE, AND ECMWF SURFACE WIND COMPONENTS DURING 1988
D. Halpern, V. Zlotnicki, J. Newman, O. Brown, and F. Wentz (Remote Sensing Systems, Inc., Santa Rosa, CA.) Feb. 1991 121 p LIMITED REPRODUCIBILITY: More than 20% of this document may be affected by color photographs Original contains color illustrations
(Contracts NAS7-918; NAS8-38075; N00014-89-J-1144; NAGw-273)
(NASA-CR-189029; JPL-Publ-91-8; NAS 1.26:189029) Avail: NTIS HC/MF A06; 85 functional color pages CSCL 08C

Monthly mean global distributions for 1988 are presented with a common color scale and geographical map. Distributions are included for sea surface height variation estimated from GEOSAT; surface wind speed estimated from the Special Sensor Microwave Imager on the Defense Meteorological Satellite Program spacecraft; sea surface temperature estimated from the Advanced Very High Resolution Radiometer on NOAA spacecrafts; and the Cartesian components of the 10m height wind vector computed by the European Center for Medium Range Weather Forecasting. Charts of monthly mean value, sampling distribution, and standard deviation value are displayed. Annual mean distributions are displayed. Author

N92-12386# Norwegian Defence Research Establishment, Kjeller.
OCEAN/BOTTOM ACOUSTIC INTERACTION WITH ARBITRARY BOTTOM PROFILE
Ivar Lie 5 Jun. 1991 26 p
(FFI-91/7009; ISSN-0802-2437; ETN-91-90259) Avail: NTIS HC/MF A03

A mathematical model for ocean/bottom acoustic interaction using a multidomain spectral technique was previously presented. This model uses a nonlinear variable coefficient set of partial differential equations for acoustic propagation in water, and the conventional equations for linear elasticity with variable coefficients to model the acoustics in the bottom. The mathematical model is now generalized to allow for arbitrary bottom profiles. The study of acoustic propagation with arbitrary bottom profiles is important to study phenomena like e.g., diffraction from a seamount and mode coupling for a sloping bottom. Numerical experiments show that the results of the model agree with those of other related models. ESA

51 LIFE SCIENCES (GENERAL)

N92-12387# Kansas State Univ., Manhattan. Dept. of Agronomy.
RANGELAND-PLANT RESPONSE TO ELEVATED CO2
C. E. Owensby, P. I. Coyne, and L. M. Auen 1989 42 p
(Contract DE-FG02-84ER-60253)
(DE90-013702; DOE/ER-60253/8) Avail: NTIS HC/MF A04

Effects of carbon dioxide enrichment on a tallgrass ecosystem were monitored during the 1989 growing season. The experimental site was located in pristine Tallgrass Prairie north of/and adjacent to the Kansas State University campus. Vegetation on the site was a mixture of C3 and C4 species and was dominated by big bluestem and indiangrass. Subdominants included Kentucky bluegrass, sideoats grama, and tall dropseed. Principal forbs included western ragweed, Louisiana sagewort, and mayflower scurfpea. The area was ideal for meeting the experimental objectives, in that the mixture of C3 and C4 plants would allow for assessment of competitive relationships among numerous species of both carbon fixation pathways. The objectives of this project were: to characterize the effects of CO2 enrichment on changes in diet selection and diet quality for ruminants, to monitor

plant population dynamics under ambient and CO2-enriched atmospheres, and to measure biomass accumulation and leaf area during the growing season under ambient and CO2-enriched atmospheres. During 1989, we developed and tested the system and were able to collect substantial data concerning the effects of CO2 enrichment of tallgrass prairie. In this report, we detail chamber design, data acquisition, control of the chamber environment, biomass and leaf area response to CO2 enrichment, and collection of forage quality samples using esophageally fistulated sheep. DOE

N92-12388*# National Aeronautics and Space Administration, Washington, DC.
LIFE SCIENCES REPORT 1987
Dec. 1987 94 p Original contains color illustrations
(NASA-TM-105105; NAS 1.15:105105) Avail: NTIS HC/MF A05; 52 functional color pages CSCL 06B

Highlighted here are the major research efforts of the NASA Life Sciences Division during the past year. Topics covered include remote health care delivery in space, space biomedical research, gravitational biology, biospherics (studying planet Earth), the NASA Closed Ecological Life Support System (CELSS), exobiology, flight programs, international cooperation, and education programs. Author

N92-12389*# Louisville Univ., KY. Dept. of Microbiology and Immunology.
COSMOS-1989 IMMUNOLOGY STUDIES Final Report
Gerald Sonnenfeld Oct. 1991 69 p
(Grant NAG2-614)
(NASA-CR-188970; NAS 1.26:188970) Avail: NTIS HC/MF A04 CSCL 06B

Evidence from both human and rodent studies has indicated that alterations in immunological parameters occur after space flight. The number of flight experiments has been small, and the full breadth of immunological alterations occurring after space flight remains to be established. Among the major effects on immune responses after space flight that have been reported are: alterations in lymphocyte blastogenesis and natural killer cell activity, alterations in production of cytokines, changes in leukocyte sub-population distribution, and decreases in the ability in the ability of bone marrow cells to respond to colony stimulating factors. Changes have been reported in immunological parameters of both humans and rodents. The significance of these alterations in relation to resistance to infection remains to be established. The current study involved a determination of the effects of flight on Cosmos mission 2044 on leukocyte subset distribution and the sensitivity of bone marrow cells to colony stimulating factor-GM. A parallel study with antiorthostatic suspension was also carried out. The study involved repetition and expansion of studies carried out on Cosmos 1887. Author

N92-12390*# Louisville Univ., KY. Dept. of Microbiology and Immunology.
EFFECT OF SPACE FLIGHT ON INTERFERON PRODUCTION - MECHANISTIC STUDIES Final Report
Gerald Sonnenfeld Oct. 1991 68 p
(Grant NAG9-181)
(NASA-CR-188972; NAS 1.26:188972) Avail: NTIS HC/MF A04 CSCL 06B

Ground-based models were studied for the effects of space flight on immune responses. Most time was spent on the model for the antiorthostatic, hypokinetic, hypodynamic suspension model for rats. Results indicate that suspension is useful for modeling the effects of spaceflight on functional immune responses, such as interferon and interleukin production. It does not appear to be useful for modeling shifts in leukocyte sub-populations. Calcium and 1,25-dihydroxyvitamin D sub 3 appear to play a pivitol role in regulating shifts in immune responses due to suspension. The macrophage appears to be an important target cell for the effects of suspension on immune responses. Author

N92-12391# Technische Univ., Berlin (Germany, F.R.). Fachbereich Informatik.
COMPUTER AIDED MODELIZATION OF RIBOSOMIC DATA Ph.D. Thesis [COMPUTERGESTUETZTES MODELLIEREN RIBOSOMALER DATEN]
Dierk Schueler 1990 143 p In GERMAN
(ETN-91-90161) Avail: NTIS HC/MF A07

A formal concept is presented for describing ribosomic data. A reference model allows the integration of various data in a three dimensional model. This reference model is realized by an acyclic graph. The nodes are to be interpreted as atoms, elements of secondary or quaternary structure. A particular process, which is responsible for the conversion of experimental results in the reference model (ribosomic model) corresponds with each experiment. It ensues an interlaced system with distributed semantics. The integration of the reference model and of the system communication is realized by postcript as a programming language. The visualization allows the graphic conversion of three dimensional data. Graphic objects can be associated with each node. ESA

N92-12392*# Jet Propulsion Lab., California Inst. of Tech., Pasadena. Advanced Industrial Concepts Div.
CATALYSIS AND BIOCATALYSIS PROGRAM Annual Report, FY 1990
Mar. 1991 164 p
(Contracts NAS7-918; DE-AI01-86CE-90239)
(NASA-CR-189452; NAS 1.26:189452; JPL-Publ-91-4; DOE/CS-66001-14) Avail: NTIS HC/MF A08 CSCL 06C

The annual report presents the fiscal year (FY) 1990 research activities and accomplishments for the Catalysis and Biocatalysis Program of the Advanced Industrial Concepts Division (AICD), Office of Industrial Technologies of the Department of Energy (DOE). The mission of the AICD is to create a balanced program of high risk, long term, directed interdisciplinary research and development that will improve energy efficiency and enhance fuel flexibility in the industrial sector. The Catalysis and Biocatalysis Program's technical activities were organized into five work elements: the Molecular Modeling and Catalysis by Design element; the Applied Microbiology and Genetics element; the Bioprocess Engineering element; the Separations and Novel Chemical Processes element; and the Process Design and Analysis element. Author

N92-12393# Umea Univ. (Sweden). Dept. of Microbiology.
A MOLECULAR ANALYSIS OF BETA-LACTAMASES AND THEIR PROMOTORS IN STREPTOMYCES Ph.D. Thesis
Mats Forsman 1991 116 p
(Grant B90-16X-07171-06A)
(FOA-B-40392-4.4; ISBN-91-7174-574-2; ETN-91-90279) Avail: NTIS HC/MF A06

A molecular analysis of extracellular beta lactamases of Streptomyces was undertaken to study transcription and structure of antibiotic resistance genes in Streptomyces. Genes encoding the extracellular beta lactamases of S. badius, S. cacaoi, S. fradiae and S. lavendulae were cloned into S. lividans. Each of the beta lactamases were expressed in and then secreted from S. lividans. Results are that: Streptomyces beta lactamases belong to the superfamily of class A beta lactamases genes; S. lividans contains an RNA polymerase that recognizes the same sequence determinants and chooses the same point of initiation of RNA synthesis as the corresponding E. colienzyme; the S. fradiae beta lactamase class of promotors is probably recognized by unidentified sigma factors. For individual titles, see N92-12394 through N92-12398.

N92-12394# National Defence Research Establishment, Umea (Sweden). Dept. of Cell and Microbiology.
BETA-LACTAMASE GENES OF STREPTOMYCES BADIUS, STREPTOMYCES CACAOI AND STREPTOMYCES FRADIAE: CLONING AND EXPRESSION IN STREPOTOMYCES LIVIDANS
Bengtake Jaurin, Mats Forsman, and Britta Haeggstroem *In* Umea Univ., A Molecular Analysis of Beta-Lactamases and Their

Promoters in Streptomyces 1991 p 65-74 Repr. from Biochimica et Biophysica Acta, v. 949 (Elsevier Science Publishers B.V.), 1988 p 288-296 (For primary document see N92-12393 03-51)
(Grant B86-16X-7171-2A)
Avail: NTIS HC/MF A06

Genes encoding extracellular beta lactamases (EC 3.5.2.6) of Gram-positive Streptomyces badius, Streptomyces cacaoi and Streptomyces fradiae have been cloned into Streptomyces lividans. The beta lactamase gene of S. badius was initially isolated on 7 kb BamHI fragment and further located on a 1300 bp DNA (Deoxyribonucleic Acid) segment. An 11 kb BamHI fragment was isolated encompassing the S. cacaoi beta lactamase gene, which was subcloned to a 1250 bp DNA fragment. The beta lactamase gene of S. fradiae was cloned on an 8 kb BamHI fragment and mapped to a 4 kb DNA segment. Each of the three BamHI fragments encompassing the beta lactamase genes hybridized to a BamHI fragment of the corresponding size in chromosomal DNA from the respective strain used for cloning. The activities of the three beta lactamases were predominantly found to be extracellular in the S. lividans recombinants. The S. badius and S. cacaoi beta lactamases exhibited a 10 to 100 times lower activity in S. lividans, whereas the S. fradiae beta lactamase showed an approximately 10 fold higher activity in the cloned state, compared with the activities found in the original strains. ESA

N92-12395# National Defence Research Establishment, Umea (Sweden). Dept. of Cell and Microbiology.
MOLECULAR ANALYSIS OF BETA-LACTAMASES FROM FOUR SPECIES OF STREPTOMYCES: COMPARISON OF AMINO ACID SEQUENCES WITH THOSE OF OTHER BETA-LACTAMASES
Mats Forsman, Britta Haeggstroem, Lena Lindgren, and Bengtake Jaurin *In* Umea Univ., A Molecular Analysis of Beta-Lactamases and Their Promoters in Streptomyces 1991 p 77-86 Repr. from Journal of General Microbiology, v. 136 (England), 1990 p 589-598 (For primary document see N92-12393 03-51)
(Grant B88-16X-7171-4A)
Avail: NTIS HC/MF A06

Genes encoding extracellular beta lactamases of Streptomyces badius, Strepotomyces cacaoi, Strepotomyces fradiae and Streotomyces lavendulae were cloned and mapped in Streptomyces lividans. DNA (Deoxyribonucleic Acid) sequence analysis of the beta lactamase genes revealed a high overall G + C content, ranging from 71 to 75 mol, with a G + C content of 95 mol at the third position of the codons for all four genes. The primary structure of the beta lactamases including their signal peptides was deduced. The four beta lactamases exhibited homology to each other and to class A beta lactamases from other bacterial genera. Streptomyces beta lactamases are suggested as being representatives of a superfamily of genes, from which class A beta lactamases of gram-negative bacteria may have evolved. ESA

N92-12396# National Defence Research Establishment, Umea (Sweden). Dept. of Cell and Microbiology.
TRANSCRIPTIONAL INDUCTION OF STREPTOMYCES CACAOI BETA-LACTAMASE BY A BETA-LACTAM COMPOUND
Mats Forsman, Lena Lindgren, Britta Haeggstroem, and Bengtake Jaurin *In* Umea Univ., A Molecular Analysis of Beta-Lactamases and Their Promoters in Streptomyces 1991 p 89-96 Repr. from Molecular Microbiology, v. 3, no. 10, 1989 p 1425-1432 (For primary document see N92-12393 03-51)
(Grant B88-16X-7171-4A)
Avail: NTIS HC/MF A06

The soil bacterium Streptomyces cacaoi produces an extracellular beta lactamase. The beta lactamase expression could be induced by the beta lactam compound 6-Amino Penicillinoic Acid (6-APA). In liquid cultures, a 50 fold increase in beta lactamase expression was observed within the first three hours after addition of 6-APA. Using the cloned beta lactamase gene as probe, it was shown that this increase was mediated at the level of transcriptional initiation. The start point of the induced beta lactamase transcript was determined, and the nucleatide sequence of the promoter region was analyzed. No noticeable homology was found to control regions of inducible beta lactamase genes of other bacteria. A striking feature was the presence of six direct repeats (ten base pairs each) upstream of the promotor region. Thus, an example of an inducible regulatory gene system in the gram-positive microorganism is presented. Also, the primary structure of the beta lactamase was deduced, showing as high degree of homology with class A beta lactamases. ESA

N92-12397# National Defence Research Establishment, Umea (Sweden). Div. of Microbiology.
MUTAGENIC ANALYSIS OF THE S. FRADIAE BETA-LACTAMASE PROMOTER
Mats Forsman and Micheal Granstroem *In* Umea Univ., A Molecular Analysis of Beta-Lactamases and Their Promoters in Streptomyces 1991 p 99-115 Submitted for publication (For primary document see N92-12393 03-51)
(Grant B90-16X-07171-06A)
Avail: NTIS HC/MF A06

The S. fradiae beta lactamase promoter was sequenced and characterized by promoter probing, primer extension, and Exo III nuclease deletions. Transcriptional initiation was directed from the same nucleotide in both S. lividans and S. fradiae. Oligonucleotide directed random mutations and site specific mutations were introduced in the promoter region. The effects of these mutations on transcription were determined by using a newly developed RNA colony hybridization method. This analysis identified cis-acting sequence determinants located analogous to the -10 and -35 region of a typical E. coli promoter. The S. fradiae beta lactamase promoter was shown not to be recognized by sigma-whiG or by sigma-hrdA, hrdC, or hrdD. Sequence alignment to sigma factor classified Streptomyces promoters revealed little homology. Thus, the S. fradiae beta lactamase promoter is probably recognized by an unidentified sigma factor. ESA

N92-12398# National Defence Research Establishment, Umea (Sweden). Dept. of Cell and Microbiology.
CHROMOGENIC IDENTIFICATION OF PROMOTERS IN STREPTOMYCES LIVIDANS BY USING AN ampC BETA-LACTAMASE PROMOTER-PROBE VECTOR
Mats Forsman and Bengtake Jaurin *In* Umea Univ., A Molecular Analysis of Beta-Lactamases and Their Promoters in Streptomyces 1991 p 119-12 Repr. from Mol. Gen. Genet., v. 210, 1987 p 23-32 (For primary document see N92-12393 03-51)
(Grant B86-16X-7171-2A)
Avail: NTIS HC/MF A06

The construction and application of a promoter probe vector in S. lividans is reported. The vector which has the ampC beta lactamase gene of E. coli as an indicator of promoter activity, allowed the isolation of promoters by employing the chromogenic compound nitrocefin as a substrate. One promoter, an SEP representative, was shown to direct transcription from the same nucleotide start sites in both S. lividans and E. coli. ESA

N92-12399# National Defence Research Establishment, Umea (Sweden). Dept. of NBC-Defence.
CHARACTERIZATION OF A ROTATING DRUM FOR LONG TERM STUDIES OF AEROSOLS
Ingrid Faengmark and Lars-Erik Wikstroem Jun. 1991 22 p In SWEDISH; ENGLISH summary
(FOA-C-40261-4.5; ISSN-0347-2124; ETN-91-90280) Avail: NTIS HC/MF A03; National Defence Research Establishment, S-901 82 Umeaa, Sweden, HC 100 Swedish crowns

As a basis for future studies on survival of airborne microorganisms, the coagulation and sedimentation losses in a 66 1 rotating drum was investigated. The number of particles that remain within the drum as a function of time was studied during 30 hours, at concentrations between 1000 to 100,000 particles/cu cm. The size distribution of the aerosol was determined as a function of time and methods to fill the drum and take samples from the drum were developed. The results show that the rotating

drum is a suitable chamber for long term studies of aerosols. When the initial concentration of bacteria within the drum is kept between 10,000 to 100,000 bacteria/cu cm and the rotation rate is 0.4 rpm, it was possible to study the survival of airborne bacteria during at least 24 hours. ESA

N92-12400# National Defence Research Establishment, Umea (Sweden). Dept. of NBC-Defence.
BIOLOGICAL DOSIMETRY: A REVIEW OF METHODS AVAILABLE FOR DETERMINATION OF IONIZING RADIATION DOSE
Bjoern Sandstroem Apr. 1991 29 p In SWEDISH; ENGLISH summary
(FOA-C-40282-4.3; ISSN-0347-2124; ETN-91-90281) Avail: NTIS HC/MF A03; National Defence Research Establishment, S-901 82 Umeaa, HC 100 Swedish crowns

Biological dosimetry is addressed with a short history of work on the subject and a discussion on the symposium of Trends in Biological Dosimetry in Italy, 22 to 27 Oct. 1990. A review of methods of biological dosimetry of ionizing radiation from literature on this subject is presented. ESA

N92-12401# Department of Energy, Washington, DC. Energy Biosciences Div.
DIVISION OF ENERGY BIOSCIENCES: SUMMARIES OF FY 1991 ACTIVITIES Annual Report
Sep. 1991 114 p
(DE92-000518; DOE/ER-0511P) Avail: NTIS HC/MF A06

As a component of the Department of Energy, the Energy Biosciences (EB) program of the Office of Basic Energy Sciences supports long-term research aimed at addressing energy-related problems utilizing biological systems. There are three main components of the EB program. The first, Primary Biological Energy Conversion, concentrates on research on plant and microbial photosynthesis, but also deals with plant growth control, stress reactions, and interaction with pathogens. The second, Bioconversion of Products, concentrates on utilization of the products of primary energy conversion. Specific examples include biosynthesis of potential fuels or chemicals, biodegradation of lignocellulose into potentially useful compounds, plant/microbe symbiosis, microbial methanogenesis and fermentation. The third main component of the EB program involves providing the basic research infrastructure to support future discoveries. The emphasis here is on investigation of basic genetic mechanisms, both in novel systems and extensively studied systems such as maize; development of critical databases, techniques, and instrumentation; and support of training in areas that are important but underpopulated. Brief descriptions of currently supported research projects are provided. DOE

52 AEROSPACE MEDICINE

Includes physiological factors; biological effects of radiation; and effects of weightlessness on man and animals.

N92-12402# Midwest Research Inst., Golden, CO.
IMMUNOLOGICAL AND BIOCHEMICAL EFFECTS OF 60 Hz ELECTRIC AND MAGNETIC FIELDS IN HUMANS
Charles Graham and Sophia S. Fotopoulos 1990 5 p
(Contract DE-FC01-84CE-76246)
(DE90-012546; DOE/CE-76246/T5) Avail: NTIS HC/MF A01

In order to meet rising energy demands, utility companies have increased both the number and the voltages employed in their overhead power transmission lines. Public concern has been expressed about possible risks to human health and function arising from the resulting increase in exposure to the electric and magnetic fields generated by such line. The present project is addressing these concerns by conducting a comprehensive research program to evaluate the effects of relevant electric and magnetic field exposure conditions on multiple measures of human function. This project is being conducted in two phases. Phase 1 was performed in cooperation with the New York State Department of Health (NYSDH). Its purpose was to collect and analyze biochemical data from human subjects participating in the first comprehensive double-blind study of the effects of, exposure to combined 60 Hz electric and magnetic fields. Phase 2 is designed to accomplish three major tasks: perform additional statistical analysis of the data collected in the double-blind study; develop procedures to measure human physiology in active 60 Hz fields under double-blind control conditions; and conduct a study to validate the physiological measurement procedures, and to partially replicate the findings of the previous study. DOE

N92-12403# Midwest Research Inst., Kansas City, MO.
IMMUNOLOGICAL AND BIOCHEMICAL EFFECTS OF 60 Hz ELECTRIC AND MAGNETIC FIELDS IN HUMANS
Sophia S. Fotopoulos and Charles Graham 1990 20 p
(Contract DE-FC01-84CE-76246)
(DE90-012547; DOE/CE-76246/T6) Avail: NTIS HC/MF A03

Demand for electric energy increased at an annual average rate of 7.5 pct. between 1912 and 1971. In order to meet this demand, utility companies have increased the number and size of their generating units and the operating voltages employed in overhead transmission lines. Recently public concern has been expressed about possible risks to human health, function, and well-being arising from exposure to the electric and magnetic fields associated with overhead transmission line voltage. The Department of Energy funded the present project to investigate the effects of 60-Hz electric and magnetic fields on critically important immunological, biochemical, and hematological variables. Inclusion of such variables will be of great value in assessing the effects of 60-Hz fields on human health and welfare, and will provide results comparable to ongoing animal studies. The scope of this project includes six major goals: development of systems for incorporating biochemistry, hematology, and immunology data collection into the procedures already developed for the performance and physiology study funded by the New York State Overhead Power Lines Project; development of sample tracking and quality assurance procedures for project data; methods development and setting up of all procedures for performing assays; collecting data; carrying out assays according to the procedures defined; and statistically evaluating and interpreting the effects of 60-Hz exposure on hematological, biochemical, and immunological parameters. DOE

N92-12404* National Aeronautics and Space Administration, Washington, DC.
AEROSPACE MEDICINE AND BIOLOGY: A CONTINUING BIBLIOGRAPHY WITH INDEXES (SUPPLEMENT 354)
Oct. 1991 86 p
(NASA-SP-7011(354); NAS 1.21:7011(354)) Avail: NTIS HC A05; NTIS standing order as PB91-912300, $15.00 domestic, $30.00 foreign CSCL 06E

This bibliography lists 225 reports, articles and other documents introduced into the NASA Scientific and Technical Information System during September, 1991. Subject coverage includes aerospace medicine and psychology, life support systems and controlled environments, safety equipment, exobiology and extraterrestrial life, and flight crew behavior and performance. Author

N92-12405# Ecole Nationale Superieure des Telecommunications, Paris (France). Groupe Images.
MATHEMATICAL MORPHOLOGY AND ACTIVE CONTOUR MODEL: A COOPERATIVE APPROACH OF LUNG CONTOURS IN CT
Francoise Preteux and Y. Hel-Or (Hebrew Univ., Jerusalem, Israel) Mar. 1991 10 p Presented at the Computer Assisted Radiology, Berlin, Fed. Republic of Germany, 3-6 Jul. 1991 Submitted for publication
(TELECOM-Paris-91-C-004; ISSN-0751-1337; ETN-91-90118)
Copyright Avail: NTIS HC/MF A02

An energy formulation for solving the problem of lung contour detection based on mathematical morphology and active contour models is proposed. The novelty of this contribution is to express

the external energy functional as a combination of conditional gradient and atomical a priori knowledge expressed in terms of distance functions. The aspect of sensitivity to the initialization step is overcome by combining expanding and shrinking deformation processes. It results in an automatic and parameter independent algorithm yielding the lungs' contours under either of three following complex cases: overinflated, close together, or with hyperattenuated areas located close to the peripherical pleura. ESA

N92-12406# Ecole Nationale Superieure des Telecommunications, Paris (France).
THREE DIMENSIONAL RECONSTRUCTION OF VASCULAR NETWORKS IN TRINOCULAR VISION Ph.D. Thesis [RECONSTRUCTION TRIDIMENSIONNELLE DE RESEAUX VASCULAIRES EN VISION TRINOCULAIRE]
Christophe Venaille 1990 169 p In FRENCH; ENGLISH summary
(TELECOM-Paris-90-E-022; ISSN-0751-1353; ETN-91-90119)
Copyright Avail: NTIS HC/MF A08

An algorithm for three dimensional reconstruction of vascular networks requiring only three projections of the network is described. The methodology of the technique is based on work carried out on artificial vision and especially computer stereovision. A bibliography of work carried out on vascular imagery and three dimensional vision is presented. The correspondence algorithm proposed uses primitive curved branches, total cooperation between the three images used and an overall management of the network overlaps by means of a combined optimization algorithm. The medical applications of the technique are discussed. ESA

N92-12407# Technische Univ., Berlin (Germany, F.R.). Fachbereich Informatik.
PATTERN RECOGNITION IN BIOSIGNALS. APPLICATION TO THE SIGMA SPINDLES IN SLEEP ELECTROENCEPHALOGRAMS Ph.D. Thesis [MUSTERERKENNUNG IN BIOSIGNALEN ANWENDUNG AUF DIE SIGMA-SPINDELN IM SCHLAF-ELEKTROENZEPHALOGRAMM]
Jutta Gampe 1991 104 p In GERMAN
(ETN-91-90166) Avail: NTIS HC/MF A06

A great quantity of data can be obtained from a sleep derivation of several hours. Sigma spindles are electroencephalogram patterns, which are to be found essentially in number two sleep stage and which are of particular importance for the analysis of sleep microstructures, with regard to their diagnostical and pharmalogical significance. A process for automatic spindle recognition is realized by adaptive segmentation of the electroencephalogram signal and classification of segments produced on the basis of a learning sampling tests. This process enables a flexible analysis of spindles to be found. ESA

N92-12408# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Analysis, Algebra and Geometry.
CARDIAC MAGNETIC RESONANCE IMAGING BY RETROSPECTIVE GATING: MATHEMATICAL MODELLING AND RECONSTRUCTION ALGORITHMS
J. B. T. M. Roerdink and M. Zwaan Dec. 1990 47 p Sponsored by Netherlands Organization for the Advancement of Research
(CWI-AM-R9024; ETN-91-90223) Copyright Avail: NTIS HC/MF A03

Some mathematical aspects of Magnetic Resonance Imaging (MRI) of the beating human heart are considered. In particular the so called retrospective gating technique which is a nontriggered technique for data acquisition and reconstruction of (approximately) periodically changing organs like the heart is investigated. The reconstruction problem is formulated as a moment problem in a Hilbert space and the solution method is given. The stability of the solution is investigated and various error estimates are given. The reconstruction method consists of temporal interpolation followed by spatial Fourier inversion. Different choices for the Hilbert space H of interpolating functions are possible. In particular, the case where H is the space of bandlimited functions, or the space of spline functions of odd degree is studied. The theory is applied to reconstructions from synthetic data as well as real MRI data. ESA

N92-12409# Brookhaven National Lab., Upton, NY.
WHEN IS A DOSE NOT A DOSE?
V. P. Bond 1991 34 p Presented at the National Council on Radiation Protection and Measurements (NCRP) Annual Meeting, Washington, DC, 2-3 Apr. 1991
(Contract DE-AC02-76CH-00016)
(DE92-000132; BNL-46568; CONF-9104298-1) Avail: NTIS HC/MF A03

Although an enormous amount of progress has been made in the fields of radiation protection and risk assessment, a number of significant problems remain. The one problem which transcends all the rest, and which has been subject to considerable misunderstanding, involves what has come to be known as the linear non-threshold hypothesis, or linear hypothesis. Particularly troublesome has been the interpretation that any amount of radiation can cause an increase in the excess incidence of cancer. The linear hypothesis has dominated radiation protection philosophy for more than three decades, with enormous financial, societal and political impacts and has engendered an almost morbid fear of low-level exposure to ionizing radiation in large segments of the population. This document presents a different interpretation of the linear hypothesis. The basis for this view lies in the evolution of dose-response functions, particularly with respect to their use initially in the context of early acute effects, and then for the late effects, carcinogenesis and mutagenesis. DOE

N92-12410# Argonne National Lab., IL. Biological and Medical Research Div.
HISTORY OF THE DETERMINATION OF RADIUM IN MAN SINCE 1915
J. Rundo 1991 27 p Presented at the International Workshop on Radium, Uranium, Thorium and Related Nuclides in Industry and Medicine: History and Current Use, Badgastein, Austria, 1-3 Oct. 1991
(Contract W-31-109-eng-38)
(DE92-000355; ANL/CP-74386; CONF-911011-1) Avail: NTIS HC/MF A03

The determination of radium in man can be traced back to experiments in 1915 when volunteers were injected with, or ingested, solutions of a radium salt, and the excreta were analyzed for radium. However, the first direct demonstrations of the presence of radium in vivo years after exposure were reported in 1925 by Martland et al. A few years later, Schlundt et al. repeated Martland's types of measurements with a Wulf-Hess electroscope, in an attempt to be quantitative. Data on the excretion rate of radium were published by Schlundt and Failla in 1931. The results of an investigation by the US Public Health Service of the health aspects of radium dial painting were published in three papers in 1933. In the second of these, Ives et al. reported results for 40 subjects who showed gamma-ray results of 1 micro-g radium (i.e., retained radon) or more. There was a major improvement in sensitivity in 1937 when Evans described the use of a Geiger-Mueller detector and the metre-arc geometry. Ten years later, Hess and McNiff published details of an ionization chamber method that did permit such levels to be determined. In the early 1950s, three groups described the first equipments for the assay of radioactivity in the human body that could detect the radiation from the naturally radioactive potassium content. In 1955, the introduction by Marinelli et al. of the sodium iodide crystal as gamma-ray detector revolutionized the assay of radium (and all other gamma-ray emitters) in vivo. These factors have all contributed to a steady decrease in the lower limit of detection of radium in man that was roughly exponential from 1929 to the mid-1950s with a half-period of a little over 3 years. DOE

N92-12411# Oak Ridge National Lab., TN. Health and Safety Research Div.
NUCLEAR MEDICINE PROGRAM Quarterly Progress Report, 30 Jun. 1991
F. F. Knapp, Jr., K. R. Ambrose, A. P. Callahan, D. W. McPherson, S. Mirzadeh, P. C. Srivastava, A. Hasan, C. R. Lambert, S. J. Lambert, and D. E. Rice Sep. 1991 20 p
(Contract DE-AC05-84OR-21400)
(DE92-000383; ORNL/TM-11881) Avail: NTIS HC/MF A03

In this report the excitation functions for production of Ga-66 via alpha-induced nuclear reactions on enriched Zn-66 have been measured with E(sub alpha) less than or equal to 27.3 Mev and E(sub alpha) less than or equal to 43.7 MeV employing the stack thin-target technique. In addition, the induced activity of Ga-67 in the same sets of targets allowed an evaluation of the excitation functions of the corresponding nuclear reactions. These preliminary studies have demonstrated that sufficient levels of Ga-66 can be produced by alpha-induced reactions on enriched Zn targets. A series of radioiodinated analogues of 1-azabicyclo (2.2.2) oct-3-yl alpha-hydroxy-alpha,alpha diphenylacetate (QNB) have been prepared. These new analogues include 1-azabicyclo (2.2.2) oct-3-yl alpha-hydroxy-alpha (4-iodophenyl)-alpha-methylacetate(2,I-QNA), 1-azabicyclo (2.2.2) oct-3-yl (3-iodo) xanthene-9-carboxylate (3,I-QNX), and 1-azabicyclo (2.2.2) oct-3-yl alpha-hydroxy-alpha (E-1-iodo-1-propen-3-yl) alpha-phenylacetate (4,I-QNP), which have also been radiolabeled with I-125 with high specific activity. The biodistribution, brain uptake, and receptor specificity of these new analogues are currently being studied. Shipments of radioactive agents made to collaborators during this period included: One shipment of I-125-labeled 15-(p-iodophenyl) 3-R,S-methylpentadecanoic acid (BMIPP) and W-188/Re-188 generator. DOE

N92-12412* National Aeronautics and Space Administration, Washington, DC.
AEROSPACE MEDICINE AND BIOLOGY: A CONTINUING BIBLIOGRAPHY WITH INDEXES (SUPPLEMENT 355)
Nov. 1991 59 p
(NASA-SP-7011(355); NAS 1.21:7011(355)) Avail: NTIS HC A03; NTIS standing order as PB91-912300, $15.00 domestic, $30.00 foreign CSCL 06E

This bibliography lists 147 reports, articles and other documents introduced into the NASA Scientific and Technical Information System during October, 1991. Subject coverage includes: aerospace medicine and psychology, life support systems and controlled environments, safety equipment, exobiology and extraterrestrial life, and flight crew behavior and performance.
Author

53 BEHAVIORAL SCIENCES

Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

N92-12413# Technische Univ., Eindhoven (Netherlands).
PERCEIVED SHARPNESS IN STATIC AND MOVING IMAGES Ph.D. Thesis
Joanne Henriette Des Westerink 1991 129 p Prepared in cooperation with Institute for Perception Research, Eindhoven, Netherlands
(ETN-91-90138) Avail: NTIS HC/MF A07

The perceptual impression made by complex images on their viewers is addressed. Effects are interpreted in relation to what is known about the human visual system wherever possible. A method of scaling is used. Experiments with slide projections as stimuli and variations of viewing distance, resolution and picture size are described. Results are interpreted in terms of consequence for high quality television systems such as high definition television. The influence of human visual acuity on subjective quality is investigated. The influence of image motion on the sharpness percept is examined for horizontal object velocities below approximately 6 degrees/s, and the findings are extended to a larger velocity range to examine possible effects of the distance covered on the screen by the object. ESA

N92-12414# Centre d'Etudes et de Recherches de Medecine Aerospatiale, Paris (France). Lab. Central de Biologie Aerospatiale.
USE OF A STANDARDIZED TEST BATTERY FOR THE EVALUATION OF PSYCHOMOTOR PERFORMANCES
Didier Lagarde, Sylviane Pradella, Olivier Gapenne, and Denise Batejat Oct. 1990 66 p In FRENCH; ENGLISH summary
(Contract DRET-89-1054)
(CERMA-90-44(LCBA); ETN-91-90105) Avail: NTIS HC/MF A04

The development of a common psychomotor performance testing strategy by all members of NATO is described. The standardized tests developed are devised such that results can be compared from one laboratory to the next. The seven tests involved in the psychomotor performance testing process are described in detail. Their specific use is outlined. The design of the software involved in the tests, and the choices made in implementing the software are discussed. ESA

54 MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

Includes human engineering; biotechnology; and space suits and protective clothing.

For related information see also *16 Space Transportation.*

N92-12415 Colorado Univ., Boulder.
ULTRASONIC APPLICATIONS FOR SPACE-BASED LIFE SUPPORT SYSTEMS Ph.D. Thesis
Amos Steve Johnson 1990 218 p
Avail: Univ. Microfilms Order No. DA9122615

The reduction of gravitational acceleration forces in spaceborne environments allows the behavior of fluids to be dominated by forces normally masked by gravity. This behavior presents challenges and opportunities in the design of systems expected to operate in space. The dependence of life support systems on such fluid interactions to accomplish various processes can not be overlooked. For example, phase separation is one of the major fluid handling difficulties routinely faced in space technology, including life support systems. A vigorous manned space program demands the recycling of life support materials. Ultrasound is investigated as a potential technology to specifically address these problems. Earthbound applications for ultrasound are varied, which leads the investigation toward a multipurpose operational component of life support systems. Investigations have shown that the acoustic intensity gradients generated by ultrasound can be effectively used for multiphasic fluid pumping, fluid mixing, gas transfer across membranes, and cleaving complex biological compounds into smaller biologically digestible units. Investigations suggest that in addition to pumping fluids, acoustic gradients can further accelerate gas liquid phase separations. The physical arrangement, geometries, and limits of such uses are suggested by the tests done here. The critical parameters of sound frequencies and amplitudes are highlighted with regard to the noted applications. The capacity to perform many functions in microgravity is a particular asset further enhanced by the simplicity and compactness of such hardware. These characteristics will trade favorably in terms of the mass and volume committed to an ultrasonic system compared to conventional technologies.
Dissert. Abstr.

N92-12416*# Lockheed Engineering and Sciences Co., Houston, TX.
THE EFFECT OF ON/OFF INDICATOR DESIGN ON STATE CONFUSION, PREFERENCE, AND RESPONSE TIME PERFORMANCE, EXECUTIVE SUMMARY
Kimberly A. Donner, Kritina L. Holden, and Meera K. Manahan

Mar. 1991 36 p Original contains color illustrations
(Contract NAS9-17900)
(NASA-CR-185662; NAS 1.26:185662; LESC-29239) Avail: NTIS HC/MF A03; 2 functional color pages CSCL 05H

Investigated are five designs of software-based ON/OFF indicators in a hypothetical Space Station Power System monitoring task. The hardware equivalent of the indicators used in the present study is the traditional indicator light that illuminates an ON label or an OFF label. Coding methods used to represent the active state were reverse video, color, frame, check, or reverse video with check. Display background color was also varied. Subjects made judgments concerning the state of indicators that resulted in very low error rates and high percentages of agreement across indicator designs. Response time measures for each of the five indicator designs did not differ significantly, although subjects reported that color was the best communicator. The impact of these results on indicator design is discussed. Author

N92-12417# Mining and Metallurgical Inst., Hokkaido (Japan).
SURVEY ON POSSIBILITY TO UTILIZE EFFECTIVELY UNDERGROUND SPACE
Mar. 1991 55 p In JAPANESE
(DE92-703044; ETDE/JP-mf-2703044) Avail: NTIS HC/MF A04

Taking into account the circumstances that underground spaces are utilized effectively for energy and material storage, and as research facilities, a survey was made on the possibility to utilize old mines in closed mines remaining in depopulated areas in Hokkaido. This is a report of the survey carried out by Hokkaido Mine Association on a possibility of effective utilization of underground spaces, to provide a guideline to discussions of regional activation and development of underground spaces in large depths. The report first summarizes the current state of underground space utilization within and without Japan, and provides examples of underground space utilization in Japan. The report then describes the current state of underground space utilization in Hokkaido (closed mines) of metal mines and coal mines. The report further indicates the outlook and problems in effective utilization of the underground spaces (closed mines) in Hokkaido, which could include the use as energy storage, material storage, wastes storage, research facilities, underground factories, mine work training and rescue training center, and for sightseeing. DOE

N92-12418# National Research Council of Canada, Ottawa (Ontario). Systems Lab.
ERGONOMICS APPLIED TO OPERATIONAL SYSTEMS IN SPACE STATIONS
Betty Ann M. Turpin Feb. 1988 21 p
(NRC-28710; NRC-TR-Sys-016; CTN-91-60293) Avail: NTIS HC/MF A03

The aim of the ergonomist is to analyze the complete system, including the operator, the machine, and the environment, and to design it in a manner which maximizes its efficiency and safety. The ergonomic approach to the design of jobs, equipment, tasks, and operating procedures is that of fitting the task to the operator. The operator should be considered as operating in parallel with other system operations, rather than as a component operating in series with other system operations. An ergonomic approach to the development of any system requires task analysis, necessitates inclusion of the operator in development, implementation, and test phases, and requires critical evaluation of existing technologies. The unique environment of zero gravity in space poses a unique challenge for space station ergonomics. Major questions in space operation systems focus on feedback and errors, their integration with technology, design of workstations for activities within and outside of a space station with specific reference to generic prescription needs, and the pros and cons of automation and computerization. CISTI

N92-12419# Centre d'Essais en Vol, Bretigny-sur-Orge (France). Lab. de Medecine Aerospatiale.
EVALUATION OF THE AERAZUR MULTIFUNCTIONAL FLIGHT SUIT IN CENTRIFUGAL TESTS [VETEMENT MULTIFONCTIONS AERAZUR EVALUATION EN CENTRIFUGEUSE]
G. Ossard, J. M. Clere, and D. Lejeune 17 Oct. 1991 31 p In FRENCH Sponsored by Service Techniques des Programmes Aeronautiques
(Rept-38/CEV/SE/LAMAS; ETN-91-90099) Avail: NTIS HC/MF A03

A multifunctional flight suit designed to be water and air tight, fire resistant, and capable of protecting the body from acceleration and gravity overloads, is tested in a centrifuge. Its performance is compared with other protection outfits such as the ARZ-820 and the P-90. In terms of anti-G protection, the suit is found to provide no more protection than ARZ-820 despite larger air pockets. Anti-G protection with respiratory over pressure is inferior by 1.7 G to that of the GP-90. The need to tailor the flight suit to the specific morphology and needs of an individual is stressed. ESA

N92-12420# Centre d'Essais en Vol, Bretigny-sur-Orge (France). Lab. de Medecine Aerospatiale.
EVALUATION OF THE PHYSIOLOGICAL EFFECTS OF AN ADDITIONAL DEAD SPACE INVOLVED IN WEARING AN ANTI-SMOKE MASK [EVALUATION DES EFFETS PHYSIOLOGIQUES D'UN ESPACE MORT ADDITIONNEL DU AU PORT D'UNE CAGOULE ANTI-FUMEES]
Marotte, Beaumont, Canot, and Delplancq 9 Mar. 1990 39 p In FRENCH Sponsored by Service Technique des Programmes Aeronautiques
(Rept-9/CEV/SE/LAMAS; ETN-91-90113) Avail: NTIS HC/MF A03

Respiratory effects due to an additional dead air space in anti-smoke outfits equipping flight personnel is studied. Gas exchange at rest and during exercise at ground level and at high altitudes is studied. The physiological effects are quantified in order to help design an anti-smoke mask system. The results show an almost immediate increase in dead volume to compensate for the increase in dead space in the anti-smoke mask system. Respiratory imbalance is shown to be very slight. ESA

N92-12421# Messerschmitt-Boelkow-Blohm G.m.b.H., Munich (Germany, F.R.). Helicopter Div.
HELMET MOUNTED SIGHT AND DISPLAY TESTING
Hans-Dieter vonBoehm, Herbert Schreyer, and Rudolf Schranner 26 Feb. 1991 31 p Presented at the SPIE Conference 1456 HMD III, San Jose, CA, 26-28 Feb. 1991
(MBB-UD-0594-91-PUB; ETN-91-90196) Avail: NTIS HC/MF A03

The results of conducted tests of Helmet Mounted Sights (HMS) and Helmet Mounted Displays (HMD) are presented. To compare the accuracy of the different HMS Systems (on magnetic, acoustic or optical basis) it is intended to find and unify a test procedure for verification. The test conditions vary, dependent on the principle of the HMS system. Magnetic systems should be tested with the influence of magnetic disturbances, ultrasonic systems under occurrence of noise and changing characteristics of the dispersion medium air, optical systems under high luminance to check saturation effects of the sensors. Modern Integrated Helmets (IH) consist of Cathode Ray Tubes (CRTs) for displaying binocular images of television or infrared cameras and superimposed symbology and a second channel with Image Intensifier Tubes (IIT). Immportant points for checking CRTs are the resolution, distortion, homogeneity and brightness in day and night time. The most important test for the IIT channel is the resolution measured as a function of luminance of the test pattern. Tests of the basic helmet regarding head fit, earphone, center of gravity, weight etc. are also necessary because these properties have an influence on the performance of the complete man machine system. ESA

N92-12422# Messerschmitt-Boelkow-Blohm G.m.b.H., Munich (Germany, F.R.). Helicopter Div.
HELICOPTER INTEGRATED HELMET REQUIREMENTS AND TEST RESULTS
Hans-Dieter vonBoehm and Herbert Schreyer May 1991 19 p Presented at the AGARD Aerospace Medical Panel Symposium, Pensacola, FL, 2 May 1991
(MBB-UD-0595-91-PUB; ETN-91-90197) Avail: NTIS HC/MF A03

Integrated Helmet (IH) requirements for helicopter applicatons and some test results are given. A modern IH consists of two Image Intensifier Tubes (IIT) and two Cathode Ray Tubes (CRT) with an optical system including combiners to present binocular images. Additional symbology can be superimposed on the CRT or IIT image. An IH is a further development of a Helmet Mounted Display (HMD). A Helmet Mounted Sight (HS) can steer a sensor platform with a thermal camera or an air to air missile system. The main helicopter requirements of such a system are given.
ESA

N92-12423# Atomic Energy of Canada Ltd., Pinawa (Manitoba). Nuclear Research Establishment.
AN EVALUATION OF THE POTENTIAL OF COMBINATION PROCESSES INVOLVING HEAT AND IRRADIATION FOR FOOD PRESERVATION
K. Shamsuzzaman, B. Payne, L. Cole, M. Goodwin, and J. Borsa Nov. 1989 26 p
(DE91-638734; AECL-10087) Avail: NTIS HC/MF A03

Effects of combined heating and gamma radiation on Clostridium sporogenes spores and Salmonella seftenberg were examined. The order in which irradiation and heat were applied had a profound effect on the survival of the organisms. Heating of C.sporogenes spores at 95 C had very little effect on their sensitivity to subsequent irradiation, but irradiation of the spores at 0 C increased their sensitivity to subsequent heat treatment and thus reduced their heat D(sub 10) values (time required to activate the spores to 10 percent of their initial number). This radiation-induced heat sensitivity increased with the increase in radiation dose. The Z values (change in temperature required for a tenfold change in D(sub 10) values) of the spores were found to increase with the increase in pre-irradiation dose. Radiation-induced heat sensitivity was found to persist for at least 35 days in spores irradiated in frozen or freeze-dried states in distilled water or in phosphate buffer suspensions, and for at least 14 days in a number of food slurries. In phosphate buffer and nutrient broth suspensions, the radiation-heat synergism decreased with increasing pH of the media from pH 4.7 to pH 7.5. However, the effect of pH on synergism was less pronounced in spores suspended in some food slurries. Preliminary results indicate that pre-irradiation of S. senftenberg at 0.5 kGy did not change the heat sensitivity of this organism at 52 C, but when radiation and heat were applied simultaneously, synergistic inactivation was observed even at 50 C. Practical implications of these results are discussed.
DOE

N92-12424# California Univ., Berkeley. Lawrence Berkeley Lab. Applied Science Div.
AIR MOVEMENT, COMFORT AND VENTILATION IN WORKSTATIONS
F. S. Bauman, D. Faulkner, E. A. Arens, W. J. Fisk, L. P. Johnston, P. J. McNeel, D. Pih, and H. Zhang (California Univ., Berkeley.) Apr. 1991 66 p
(Contract DE-AC03-76SF-00098)
(DE92-000667; LBL-30574) Avail: NTIS HC/MF A04

This report presents findings from a research project to investigate the effects of office partition design on air movement, worker comfort, and ventilation in workstations. The objectives of the study were to evaluate the comfort and ventilation conditions produced by a conventional ceiling supply-and-return air distribution system in workstations separated by (1) solid partitions of different height (75 in., 65 in., 42 in., and 0 in.) and (2) prototype Steelcase airflow partitions, containing a gap positioned at the bottom of the partition. The project consisted primarily of experiments performed in a full-scale Controlled Environment Chamber (CEC) located in the Building Science Laboratory, Department of Architecture, University of California, Berkeley.
DOE

N92-12533# Royal Aerospace Establishment, Farnborough (England). Mission Management Aid Project.
INTEGRATING MACHINE INTELLIGENCE INTO THE COCKPIT TO AID THE PILOT
E. J. Lovesey and R. I. Davis *In* AGARD, Machine Intelligence for Aerospace Electronic Systems Sep. 1991 8 p (For primary document see N92-12517 03-63)
Copyright Avail: NTIS HC/MF A14; Non-NATO Nationals requests available only from AGARD/Scientific Publications Executive

55 SPACE BIOLOGY

Includes exobiology; planetary biology; and extraterrestrial life.

No abstracts in this category.

59 MATHEMATICAL AND COMPUTER SCIENCES (GENERAL)

N92-12425*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, MD.
SPACE AND EARTH SCIENCE DATA COMPRESSION WORKSHOP
James C. Tilton, ed. Washington Nov. 1991 85 p Workshop held in Snowbird, UT, 11 Apr. 1991; sponsored by NASA and IEEE
(NASA-CP-3130; Rept-91B00149; NAS 1.55:3130) Avail: NTIS HC/MF A05 CSCL 12A

The workshop explored opportunities for data compression to enhance the collection and analysis of space and Earth science data. The focus was on scientists' data requirements, as well as constraints imposed by the data collection, transmission, distribution, and archival systems. The workshop consisted of several invited papers; two described information systems for space and Earth science data, four depicted analysis scenarios for extracting information of scientific interest from data collected by Earth orbiting and deep space platforms, and a final one was a general tutorial on image data compression. For individual titles, see N92-12426 through N92-12433.

N92-12426*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
DATA COMPRESSION: THE END-TO-END INFORMATION SYSTEMS PERSPECTIVE FOR NASA SPACE SCIENCE MISSIONS **c82**
Wallace Tai *In* NASA. Goddard Space Flight Center, Space and Earth Science Data Compression Workshop Nov. 1991 p 5-12 (For primary document see N92-12425 03-59)
Avail: NTIS HC/MF A05 CSCL 05B

The unique characteristics of compressed data have important implications to the design of space science data systems, science applications, and data compression techniques. The sequential nature or data dependence between each of the sample values within a block of compressed data introduces an error multiplication or propagation factor which compounds the effects of communication errors. The data communication characteristics of the onboard data acquisition, storage, and telecommunication channels may influence the size of the compressed blocks and the frequency of included re-initialization points. The organization of the compressed data are continually changing depending on the entropy of the input data. This also results in a variable output

rate from the instrument which may require buffering to interface with the spacecraft data system. On the ground, there exist key tradeoff issues associated with the distribution and management of the science data products when data compression techniques are applied in order to alleviate the constraints imposed by ground communication bandwidth and data storage capacity. Author

N92-12427*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, MD.
THE MODERATE RESOLUTION IMAGING SPECTROMETER: AN EOS FACILITY INSTRUMENT CANDIDATE FOR APPLICATION OF DATA COMPRESSION METHODS c35
Vincent V. Salomonson *In its* Space and Earth Science Data Compression Workshop Nov. 1991 p 13-23 (For primary document see N92-12425 03-59)
Avail: NTIS HC/MF A05 CSCL 14B

The Moderate Resolution Imaging Spectrometer (MODIS) observing facility will operate on the Earth Observing System (EOS) in the late 1990's. It is estimated that this observing facility will produce over 200 gigabytes of data per day requiring a storage capability of just over 300 gigabytes per day. Archiving, browsing, and distributing the data associated with MODIS represents a rich opportunity for testing and applying both lossless and lossy data compression methods. Author

N92-12428*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
SAR DATA COMPRESSION: APPLICATION, REQUIREMENTS, AND DESIGNS c82
John C. Curlander and C. Y. Chang *In* NASA. Goddard Space Flight Center, Space and Earth Science Data Compression Workshop Nov. 1991 p 25-36 (For primary document see N92-12425 03-59)
Avail: NTIS HC/MF A05 CSCL 05B

The feasibility of reducing data volume and data rate is evaluated for the Earth Observing System (EOS) Synthetic Aperture Radar (SAR). All elements of data stream from the sensor downlink data stream to electronic delivery of browse data products are explored. The factors influencing design of a data compression system are analyzed, including the signal data characteristics, the image quality requirements, and the throughput requirements. The conclusion is that little or no reduction can be achieved in the raw signal data using traditional data compression techniques (e.g., vector quantization, adaptive discrete cosine transform) due to the induced phase errors in the output image. However, after image formation, a number of techniques are effective for data compression. Author

N92-12429*# California Univ., Los Angeles. Inst. of Geophysics and Planetary Physics.
SCIENTIFIC REQUIREMENTS FOR SPACE SCIENCE DATA SYSTEMS c82
Raymond J. Walker *In* NASA. Goddard Space Flight Center, Space and Earth Science Data Compression Workshop Nov. 1991 p 37-50 (For primary document see N92-12425 03-59) (Contracts JPL-958694; JPL-959026)
Avail: NTIS HC/MF A05 CSCL 05B

In the 1990's space plasma physics studies will increasingly involve correlative analysis of observations from multiple instruments and multiple spacecraft. The solar terrestrial physics missions in the 1990's will be designed around simultaneous observations from spacecraft monitoring the solar wind, the polar magnetosphere and the near and distant magnetotail. Within these regions, clusters of spacecraft flying in formation will increasingly involve comparative magnetospheric studies. No single lab will have the expertise to process and analyze all of the different types of data so the data repositories will be distributed. Catalog and browse systems will be required to help select events for study. Data compression techniques may be useful in designing the data bases used for selecting events for study. Data compression onboard the spacecraft will be necessary, since instrument data rates will be much larger than available telemetry rates. However, considerable care will be necessary to avoid losing valuable data when applying data compression algorithms. Author

N92-12430*# Analex Corp., Cleveland, OH.
MICROGRAVITY SCIENCE REQUIREMENTS AND THE NEED FOR DATA COMPRESSION c82
William G. Hartz *In* NASA. Goddard Space Flight Center, Space and Earth Science Data Compression Workshop Nov. 1991 p 51-56 (For primary document see N92-12425 03-59)
Avail: NTIS HC/MF A05 CSCL 05B

The Microgravity Science and Applications Div. (MSAD) of the NASA Office of Space Science and Applications (OSSA) is responsible for encouraging and directing the research of a wide range of physical phenomena in reduced gravity. Under MSAD's direction, NASA-Lewis is presently developing the concept of a multiuser facility which will perform combustion science experiments in space. This facility, the Combustion Experiment Module (CEM), will be located in either the Shuttle Spacelab or the Space Station Freedom lab and will be operational by mid-1997. In addition to standard instrumentation to measure temperature, pressure, and acceleration, CEM shall use a variety of imaging and optical diagnostic techniques. Images shall be the primary source of experimental data. These images create an enormous amount of data which must be archived on orbit for later analysis. Also, ground based investigators will require enough data from the orbiting facility to determine if the experimental parameters need to be changed before proceeding with the next run. The storage and transmission of this data present a major challenge to the CEM design. Data compression will play a major role in the design of the CEM diagnostics system. Author

N92-12431*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, MD.
DATA COMPRESSION FOR DATA ARCHIVAL, BROWSE OR QUICK-LOOK c82
Jeff Dozier (Universities Space Research Association, Greenbelt, MD.) and James C. Tilton *In its* Space and Earth Science Data Compression Workshop Nov. 1991 p 61-65 (For primary document see N92-12425 03-59)
Avail: NTIS HC/MF A05 CSCL 05B

Soon after space and Earth science data is collected, it is stored in one or more archival facilities for later retrieval and analysis. Since the purpose of the archival process is to keep an accurate and complete record of data, any data compression used in an archival system must be lossless, and protect against propagation of error in the storage media. A browse capability for space and Earth science data is needed to enable scientists to check the appropriateness and quality of particular data sets before obtaining the full data set(s) for detailed analysis. Browse data produced for these purposes could be used to facilitate the retrieval of data from an archival facility. Quick-look data is data obtained directly from the sensor for either previewing the data or for an application that requires very timely analysis of the space or Earth science data. Two main differences between data compression techniques appropriate to browse and quick-look cases, are that quick-look can be more specifically tailored, and it must be limited in complexity by the relatively limited computational power available on space platforms. Author

N92-12432*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
DATA COMPRESSION FOR NEAR EARTH AND DEEP SPACE TO EARTH TRANSMISSION c82
Daniel E. Erickson *In* NASA. Goddard Space Flight Center, Space and Earth Science Data Compression Workshop Nov. 1991 p 67-72 (For primary document see N92-12425 03-59)
Avail: NTIS HC/MF A05 CSCL 05B

Key issues of data compression for near Earth and deep space to Earth transmission discussion group are briefly presented. Specific recommendations as made by the group are as follows: (1) since data compression is a cost effective way to improve communications and storage capacity, NASA should use lossless

data compression wherever possible; (2) NASA should conduct experiments and studies on the value and effectiveness of lossy data compression; (3) NASA should develop and select approaches to high ratio compression of operational data such as voice and video; (4) NASA should develop data compression integrated circuits for a few key approaches identified in the preceding recommendation; (5) NASA should examine new data compression approaches such as combining source and channel encoding, where high payoff gaps are identified in currently available schemes; and (6) users and developers of data compression technologies should be in closer communication within NASA and with academia, industry, and other government agencies. Author

N92-12433*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, MD.
TECHNIQUES FOR CONTAINING ERROR PROPAGATION IN COMPRESSION/DECOMPRESSION SCHEMES c82
Ben Kobler *In its* Space and Earth Science Data Compression Workshop Nov. 1991 p 73-74 (For primary document see N92-12425 03-59)
Avail: NTIS HC/MF A05 CSCL 05B

Data compression has the potential for increasing the risk of data loss. It can also cause bit error propagation, resulting in catastrophic failures. There are a number of approaches possible for containing error propagation due to data compression: (1) data retransmission; (2) data interpolation; (3) error containment; and (4) error correction. The most fruitful techniques will be ones where error containment and error correction are integrated with data compression to provide optimal performance for both. The error containment characteristics of existing compression schemes should be analyzed for their behavior under different data and error conditions. The error tolerance requirements of different data sets need to be understood, so guidelines can then be developed for matching error requirements to suitable compression algorithms. Author

60 COMPUTER OPERATIONS AND HARDWARE

Includes hardware for computer graphics, firmware, and data processing.

For components see *33 Electronics and Electrical Engineering.*

N92-12434# Lawrence Livermore National Lab., CA.
A SCALABLE COHERENT CACHE SYSTEM WITH INCOMPLETE DIRECTORY STATE
E. D. Brooks, III and J. E. Hoag Apr. 1990 3 p Presented at the 1990 International Conference on Parallel Processing, St. Charles, 13-17 Aug. 1990
(Contract W-7405-eng-48)
(DE90-010862; UCRL-JC-103855; CONF-900874-3) Avail: NTIS HC/MF A01

We describe a directory based coherent cache system which can be scaled. Our scheme is an interpolation between the complete directory state solution by Censier and Feautrier, where the memory controller knows the disposition of the line for every cache, and the minimal state solution due to Archibald and Baer which requires broadcasts for certain state transitions. By interpolating between these solutions, and providing efficient hardware support, we can reduce the negative performance impact of broadcasts to caches which do not have a copy of the line. DOE

N92-12435# Brown Univ., Providence, RI. Dept. of Physics.
A SPECIAL FUNCTION COPROCESSOR FOR LEVEL-2
D. Cutts, J. H. Hoftun, D. Nesic, C. R. Johnson, and R. T. Zeller 26 Jun. 1990 12 p
(Contract DE-AC02-76ER-03130)
(DE90-013327; DOE/ER-03130/54; COO-313OTC-54) Avail: NTIS HC/MF A03

The idea of supplementing Level-2 filtering nodes with additional processing power has been alive within D0 collaboration for some time now. The utility of additional processing power became increasingly recognized as the Level-2 filtering code matures. Here we will describe one scenario of augmenting Level-2 nodes with coprocessing power within the framework of the present D0 data acquisition system. Primary data reduction, consisting of repetitive but simple tasks, form the major part of the first order Level-2 filter, in terms of its time budget. Such computing tasks are well suited to the coprocessor environment. In what follows we will use the term Special Function Coprocessor (SFC) to denote this additional processor. DOE

N92-12436*# Research Inst. for Advanced Computer Science, Moffett Field, CA.
SOME METHODS OF ENCODING SIMPLE VISUAL IMAGES FOR USE WITH A SPARSE DISTRIBUTED MEMORY, WITH APPLICATIONS TO CHARACTER RECOGNITION
Louis A. Jaeckel Jul. 1989 57 p
(Contracts NCC2-387; NCC2-408)
(NASA-CR-188848; NAS 1.26:188848; RIACS-TR-89-29) Avail: NTIS HC/MF A04 CSCL 09B

To study the problems of encoding visual images for use with a Sparse Distributed Memory (SDM), I consider a specific class of images- those that consist of several pieces, each of which is a line segment or an arc of a circle. This class includes line drawings of characters such as letters of the alphabet. I give a method of representing a segment of an arc by five numbers in a continuous way; that is, similar arcs have similar representations. I also give methods for encoding these numbers as bit strings in an approximately continuous way. The set of possible segments and arcs may be viewed as a five-dimensional manifold M, whose structure is like a Mobious strip. An image, considered to be an unordered set of segments and arcs, is therefore represented by a set of points in M - one for each piece. I then discuss the problem of constructing a preprocessor to find the segments and arcs in these images, although a preprocessor has not been developed. I also describe a possible extension of the representation. Author

N92-12437*# Research Inst. for Advanced Computer Science, Moffett Field, CA.
AN EMPIRICAL INVESTIGATION OF SPARSE DISTRIBUTED MEMORY USING DISCRETE SPEECH RECOGNITION
Douglas G. Danforth Mar. 1990 29 p
(Contracts NCC2-408; NCC2-387)
(NASA-CR-187893; NAS 1.26:187893; RIACS-TR-90-18) Avail: NTIS HC/MF A03 CSCL 09B

Presented here is a step by step analysis of how the basic Sparse Distributed Memory (SDM) model can be modified to enhance its generalization capabilities for classification tasks. Data is taken from speech generated by a single talker. Experiments are used to investigate the theory of associative memories and the question of generalization from specific instances. Author

N92-12438*# National Aeronautics and Space Administration. Pasadena Office, CA.
INTEGRATED, NON-VOLATILE, HIGH-SPEED ANALOG RANDOM ACCESS MEMORY Patent Application
Romney R. Katti, inventor (to NASA), Jiin-Chuan Wu, inventor (to NASA), and Henry L. Stadler, inventor (to NASA) (Jet Propulsion Lab., California Inst. of Tech., Pasadena.) 11 Feb. 1991 19 p
(Contract NAS7-918)
(NASA-Case-NPO-17998-1-CU; NAS 1.71:NPO-17998-1-CU; US-Patent-Appl-SN-653578) Avail: NTIS HC/MF A03 CSCL 09B

An invention that provides an integrated, nonvolatile, high speed random access memory is discussed. A magnetically switchable ferromagnetic or ferrimagnetic layer is sandwiched between and electrical conductor which provides the ability to magnetize the magnetically switchable layer and a magnetoresistive or Hall effect material which allows sensing the magnetic field which emanates from the magnetization of the magnetically switchable layer. By using this integrated three layer form, the writing process, which

is controlled by the conductor, is separated from the storage medium in the magnetic layer and from the readback process which is controlled by magnetoresistive layer. A circuit for implementing the memory in CMOS or the like is disclosed.
NASA

N92-12439*# Research Inst. for Advanced Computer Science, Moffett Field, CA.
BIBLIOGRAPHY FOR COMPUTER SECURITY, INTEGRITY, AND SAFETY
Rodney L. Bown (Houston Univ., Clear Lake, TX.) Aug. 1991 62 p
(Contract NCC9-16; RICIS Proj. SE-26)
(NASA-CR-188950; NAS 1.26:188950) Avail: NTIS HC/MF A04 CSCL 09B

A bibliography of computer security, integrity, and safety issues is given. The bibliography is divided into the following sections: recent national publications; books; journal, magazine articles, and miscellaneous reports; conferences, proceedings, and tutorials; and government documents and contractor reports. Author

N92-12440*# Edgerton, Germeshausen and Grier, Inc., Idaho Falls, ID.
AN INDEPENDENT REVIEW OF THE MULTI-PATH REDUNDANT AVIONICS SUITE (MPRAS) ARCHITECTURE ASSESSMENT AND CHARACTERIZATION REPORT
M. R. Johnson Feb. 1991 23 p
(Contract NASA Order L-53177-C; DE-AC07-76ID-01570)
(NASA-CR-188126; NAS 1.26:188126; DE91-018692; EGG-EE-9479) Avail: NTIS HC/MF A03 CSCL 09B

In recent years the NASA Langley Research Center has funded several contractors to conduct conceptual designs defining architectures for fault tolerant computer systems. Such a system is referred to as a Multi-Path Redundant Avionics Suite (MPRAS), and would form the basis for avionics systems that would be used in future families of space vehicles in a variety of missions. The principal contractors were General Dynamics, Boeing, and Draper Laboratories. These contractors participated in a series of review meetings, and submitted final reports defining their candidate architectures. NASA then commissioned the Research Triangle Institute (RTI) to perform an assessment of these architectures to identify strengths and weaknesses of each. This report is a separate, independent review of the RTI assessment, done primarily to assure that the assessment was comprehensive and objective. The report also includes general recommendations relative to further MPRAS development. DOE

N92-12441# Lawrence Livermore National Lab., CA.
HIGH ENERGY SEU TEST RESULTS FOR THE COMMERCIALLY AVAILABLE MIPS R3000 MICROPROCESSOR AND R3010 FLOATING POINT UNIT
D. L. Shaeffer, J. R. Kimbrough, S. M. Denton, J. L. Kaschimitter, J. W. Wilburn, R. W. Davis, N. J. Colella, and D. B. Holtkamp (Los Alamos National Lab., NM.) 15 Aug. 1991 12 p
(Contract W-7405-eng-48)
(DE91-019019; UCRL-ID-107566) Avail: NTIS HC/MF A03

Single event upset (SEU) cross sections and total dose hardness of commercially available MIPS R3000 microprocessors (CPU) and R3010 floating point units (FPU) were obtained by exposing these parts to 256 MeV protons from the linear accelerator (LINAC) at the Los Alamos Meson Physics Facility (LAMPF). Parts from several manufacturers were tested. The CPUs and FPUs were tested dynamically during radiation exposure with specially designed assembly language codes which exercised a subset of the available instructions in order to simulate the actual operation of each part. Cross sections derived from the SEU data were used to calculate expected upset rate for a 500-km orbit during quiet solar conditions, the King 1972 solar flare, and the August 4, 1972, event modeled by Adams et al. DOE

N92-12442# Los Alamos National Lab., NM.
LOS ALAMOS NATIONAL LABORATORY'S HIGH-PERFORMANCE DATA SYSTEM
C. W. Mercier, G. Chorn, R. Christman, and B. Collins 1991 4 p Presented at the Cray Users Group Conference, Santa Fe, NM, 23-27 Sep. 1991
(Contract W-7405-eng-36)
(DE92-000223; LA-UR-91-2924; CONF-9109276-2) Avail: NTIS HC/MF A01

Los Alamos National Laboratory is designing a High-Performance Data System (HPDS) that will provide storage for supercomputers requiring large files and fast transfer speeds. The HPDS will meet the performance requirements by managing data transfers from high-speed storage systems connected directly to a high-speed network. File and storage management software will be distributed in workstations. Network protocols will ensure reliable, wide-area network data delivery to support long-distance distributed processing. DOE

61 COMPUTER PROGRAMMING AND SOFTWARE

Includes computer programs, routines, alogorithms, and specific applications, e.g., CAD/CAM.

N92-12443# Fermi National Accelerator Lab., Batavia, IL.
A FAST ONLINE EVENT DISPLAY FOR A HIGH INTENSITY FIXED-TARGET SPECTROMETER
A. Napier (Tufts Univ., Medford, MA.) 3 May 1990 10 p Presented at the Computing in High Energy Physics, Santa Fe, NM, 9-13 Apr. 1990
(Contract DE-AC02-76CH-03000)
(DE90-012047; FNAL-TM-1666; CONF-9004190-10) Avail: NTIS HC/MF A02

A workstation-based event display program for the Fermilab Tagged Photon Spectrometer (TPS) is described. Fast displays are required to monitor detector elements, observe hit patterns and energy deposition, and to check track reconstruction. Design considerations, novel features, and performance are designed.
DOE

N92-12444# Brown Univ., Providence, RI. Dept. of Physics.
D0 DATA ACQUISITION: HIGH SPEED DATA PATHS FOR D0
D. Cutts, J. S. Hoftun, D. Nesic, C. R. Johnson, and R. T. Zeller 1990 14 p Presented at the Computing in High Energy Physics, Santa Fe, NM, 9-13 Apr. 1990
(Contract DE-AC02-76ER-03130)
(DE90-013326; DOE/ER-03130/53; COO-3130TC-53; CONF-9004190-12) Avail: NTIS HC/MF A03

This poster is intended as a review of the Level-2 system architecture for D0, and to provide an overview of the new generation of hardware currently under development to accomplish these functions. Several operational prototypes of the system have been built and are currently in use for detector and software development, as well as cosmic ray and test beam data acquisition. Delivery of the first half of the acquisition system is scheduled for September 1990, to be used in the commissioning of the detector. DOE

N92-12445# Sandia National Labs., Albuquerque, NM.
GRIDLESS ELECTROSTATIC FIELD SOLVER FOR PARTICLE SIMULATION CODES IN CYLINDRICAL GEOMETRY
I. R. Shokair and J. S. Wagner Jun. 1990 30 p
(Contract DE-AC04-76DP-00789)
(DE90-013602; SAND-90-1249) Avail: NTIS HC/MF A03

A new gridless electrostatic field solver which utilizes Fourier decomposition in the azimuthal coordinate has been developed and tested. The scaling with the number of simulation particles is N log N. This algorithm has been implemented in the BUCKSHOT code, which originally used a direct summation algorithm with N(exp 2) scaling. The Fourier decomposition in the new algorithm is done about the center of mass of each species, thus nonlinear ion hose physics is included in the m = O mode. Higher order modes describe nonaxisymmetric profile changes. The breakeven

point between the new solver and the direct summation algorithm is about N = 64 particles per species when up to m = 2 Fourier modes are kept. For a typical ion hose simulation with 256 particles per species the new solver is faster by a factor of about 2.7.
DOE

N92-12446# Texas Univ., Austin.
A RESEARCH PROGRAM IN FINITE ELEMENT ANALYSIS AND ITERATIVE SOLUTION ON ADVANCED PROCESSORS
G. F. Carey and D. M. Young Jun. 1990 11 p
(Contract DE-FG05-87ER-25048)
(DE90-013958; DOE/ER-25048/2) Avail: NTIS HC/MF A03

The research program is directed towards the solution of large scale problems associated with finite element and finite difference schemes for partial differential equations. Of particular interest is the use of iterative methods and finite elements on new vector parallel supercomputing architectures. Some of the work concerns theoretical issues related to convergence of the methods and parallel algorithm formulation. We are also developing new methods based on element-by-element bioconjugate gradient ideas and investigating breakdown of the methods from a theoretical standpoint. Applications to large scale engineering and scientific problems form the final component of the research program. For example, we are currently investigating PDE systems that arise in coupled viscous flow and heat transfer as well as multi-component multiphase flows in enhanced oil recovery. The work on parallel algorithms includes both theory and practical simulations with shared and distributed systems. DOE

N92-12447*# Spectra Research Systems, Inc., Huntsville, AL. Systems Technology Div.
INTERACTIVE OFFICE USER'S MANUAL
Edward E. Montgomery, Benjamin Lowers, and Terri L. Nabors 30 Mar. 1990 43 p
(Contract NAS8-36643)
(NASA-CR-184203; NAS 1.26:184203; SRS/STG-TR90-63)
Avail: NTIS HC/MF A03 CSCL 09B

Given here is a user's manual for Interactive Office (IO), an executive office tool for organization and planning, written specifically for Macintosh. IO is a paperless management tool to automate a related group of individuals into one productive system. Author

N92-12448*# Alabama Univ., Huntsville.
AUTOMATIC PROGRAMMING OF SIMULATION MODELS Final Report
Bernard J. Schroer, Fan T. Tseng, Shou X. Zhang, and Wen S. Dwan Jan. 1990 86 p
(Contract NAS8-36955; NAG8-641)
(NASA-CR-184221; NAS 1.26:184221; JRC-90-01) Avail: NTIS HC/MF A05 CSCL 09B

The concepts of software engineering were used to improve the simulation modeling environment. Emphasis was placed on the application of an element of rapid prototyping, or automatic programming, to assist the modeler define the problem specification. Then, once the problem specification has been defined, an automatic code generator is used to write the simulation code. The following two domains were selected for evaluating the concepts of software engineering for discrete event simulation: manufacturing domain and a spacecraft countdown network sequence. The specific tasks were to: (1) define the software requirements for a graphical user interface to the Automatic Manufacturing Programming System (AMPS) system; (2) develop a graphical user interface for AMPS; and (3) compare the AMPS graphical interface with the AMPS interactive user interface.
Author

N92-12449# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France). Guidance and Control Panel.
SOFTWARE FOR GUIDANCE AND CONTROL
Sep. 1991 243 p In ENGLISH and FRENCH The 24th symposium was held in Thessaloniki, Greece, 7-10 May 1991
(AGARD-CP-503; ISBN-92-835-0629-4) Copyright Avail: NTIS HC/MF A11; Non-NATO Nationals requests available only from AGARD/Scientific Publications Executive

This volume contains the 23 unclassified papers presented at the Guidance and Control Panel Symposium. The papers were presented covering the following headings: tools and methods from a user's viewpoint; general requirements on software; integrated program support environments; software requirements; design methods for real-time software; Ada applications; and automated software generation approaches. For individual titles, see N92-12450 through N92-12469.

N92-12450# GEC-Marconi Ltd., Stanmore (England).
A SURVEY OF AVAILABLE TOOLS AND METHODS FOR SOFTWARE REQUIREMENTS CAPTURE AND DESIGN
D. J. Thewlis *In* AGARD, Software for Guidance and Control Sep. 1991 7 p (For primary document see N92-12449 03-61)
Copyright Avail: NTIS HC/MF A11; Non-NATO Nationals requests available only from AGARD/Scientific Publications Executive

The contribution of the tools and methods to software development are discussed. These tools and methods are currently available to assist with the early part of the software development life cycle: that is tools and methods for requirements capture and design. The discussion of methods and their contribution to software development comes from experience gained using a Hierarchical Object Oriented Design (HOOD) tool. Author

N92-12451# Federal Ministry for Defence, Bonn (Germany, F.R.).
TOOL SUPPORTED SOFTWARE DEVELOPMENT EXPERIENCES FROM THE EFA PROJECT
Werner M. Fraedrich *In* AGARD, Software for Guidance and Control Sep. 1991 7 p (For primary document see N92-12449 03-61)
Copyright Avail: NTIS HC/MF A11; Non-NATO Nationals requests available only from AGARD/Scientific Publications Executive

The European Fighter Aircraft (EFA) Project is a multinational project. Agreement had to be reached between the partner nations (industry and government) with respect to pertinent data processing support. It is shown that general agreements were worked out by arriving at the lowest common denominator since none of the participating nations were prepared to accept standards established by another partner nation; an attempt to solve this problem is presented. The following topics are addressed: (1) some general information on the EFA Project, including important determinations; (2) the status of the software tool selection and procurement in the EFA Project; and (3) a comparison between required and actual availability of software tools in the EFA Project. Author

N92-12452# Smiths Industries Aerospace and Defence Systems Ltd., Cheltenham (England).
MILITARY AND CIVIL SOFTWARE STANDARDS AND GUIDELINES FOR GUIDANCE AND CONTROL
K. W. Wright *In* AGARD, Software for Guidance and Control Sep. 1991 13 p (For primary document see N92-12449 03-61)
Copyright Avail: NTIS HC/MF A11; Non-NATO Nationals requests available only from AGARD/Scientific Publications Executive

The two most widely used standards covering the development of software in the military and civil avionics industries are DOD-STD-2167A and the Radio Technical Commission for Aeronautics (RTCA) DO.178A/European Organization for Civil Aviation Electronics (EUROCAE) ED-12A, respectively. This latter document is currently undergoing extensive update by RTCA Special Committee (SC) 167 and EUROCAE Working Group (WG) 12, with a planned document re-issue date of the end of 1991. A comparison of DOD-STD-2167A with the work currently being undertaken by SC.167/WG.12. Author

N92-12453# Marconi Underwater Systems Ltd., Weybridge (England).
REQUIREMENTS AND TRACEABILITY MANAGEMENT
G. M. Cross *In* AGARD, Software for Guidance and Control

Sep. 1991 5 p (For primary document see N92-12449 03-61)
Copyright Avail: NTIS HC/MF A11; Non-NATO Nationals requests available only from AGARD/Scientific Publications Executive

The contribution of requirements traceability to the system development process in risk reduction and rework avoidance and the impact on all phases of project development from requirements capture to customer acceptance and subsequent maintenance is explained. By update of the traditional lifecycle model, it is shown how the requirements of traceable management (RTM) product builds a system development environment addressing these issues and improving the benefits to users of many of todays leading computer aided software engineering (CASE) tools by more effective integration, with a total lifecycle coverage. Author

N92-12454# Naval Weapons Center, China Lake, CA.
COPROCESSOR SUPPORT FOR REAL-TIME Ada
R. K. Page *In* AGARD, Software for Guidance and Control Sep. 1991 7 p (For primary document see N92-12449 03-61)
Copyright Avail: NTIS HC/MF A11; Non-NATO Nationals requests available only from AGARD/Scientific Publications Executive

The purpose is to propose the basic elements of a real-time clock that would be suitable for use with the tasking mechanism of the Ada programming language and other real-time concurrency management systems. A real-time application needs such a clock for several reasons: (1) to relieve the processor of some of the overhead burden of time and task management; (2) to provide adequate granularity for the representation of time; and (3) to provide sufficient range for the representation of time. A more complete solution to the overhead problem is suggested: move both the clock and the task scheduling functions normally implemented in software into a concurrency management coprocessor. Author

N92-12455# Dornier Luftfahrt G.m.b.H., Friedrichshafen (Germany, F.R.).
SOFTWARE DESIGN CONSIDERATIONS FOR AN AIRBORNE COMMAND AND CONTROL WORKSTATION
P. Kielhorn, P. Kuehl, B. Muth, and R. Vissers *In* AGARD, Software for Guidance and Control Sep. 1991 16 p (For primary document see N92-12449 03-61)
Copyright Avail: NTIS HC/MF A11; Non-NATO Nationals requests available only from AGARD/Scientific Publications Executive

Some basic concepts are presented of the software design for a command and control workstation for airborne applications. Not only are theoretical considerations reported, but also practical experience, which was gained during the development process of a prototype command and control workstation at DORNIER. Special emphasis is put on software architecture, data structures, and tasking with respect to Ada. In order to get a firm basis and to ease understanding, a description is given of the tasks and the components of a command and control workstation, which includes a short description of the aforementioned DORNIER prototype workstation MODOS. Author

N92-12456# Office National d'Etudes et de Recherches Aerospatiales, Toulouse (France). GRECO Informatique.
FORMAL SPECIFICATION OF SATELLITE TELEMETRY: A PRACTICAL EXPERIENCE **c17**
Jean-Michel Hufflen and Michel Lemoine *In* AGARD, Software for Guidance and Control Sep. 1991 9 p Sponsored in part by IMAG/LIFIA, Grenoble, France; and ONERA-CERT/DERI, Toulouse, France (For primary document see N92-12449 03-61)
Copyright Avail: NTIS HC/MF A11; Non-NATO Nationals requests available only from AGARD/Scientific Publications Executive

An experience is reviewed of using formal algebraic specifications, conducted with aeronautical industry collaboration. The objective is to provide a reuseable specification for processing telemetry results. This family of spatial applications is described by means of generic formal specifications, from which telemetry could be formed. Reuse possibilities are supported by the framework. A general survey is given of this experience, including its story, the method followed for establishing the generic specifications which are the system's core, and reuse aspects provided. Author

N92-12457# GEC Avionics Ltd., Rochester (England). Technology and Systems Research Lab.
FORMAL VERIFICATION OF A REDUNDANCY MANAGEMENT ALGORITHM
Jonathan Draper *In* AGARD, Software for Guidance and Control Sep. 1991 6 p (For primary document see N92-12449 03-61)
Copyright Avail: NTIS HC/MF A11; Non-NATO Nationals requests available only from AGARD/Scientific Publications Executive

Work is described on mathematical formal verification of a redundancy management algorithm that was carried out in two stages. The first stage used the specification language Z and verified the specification with hand written rigorous proofs. The second stage used a proof tool to produce formal proofs and specified the system with the language of that proof tool. The system specified was part of a safety critical software section of an avionic system. A section is included that presents the theoretical concepts of formal methods, concentrating on specification and proof. These ideas are illustrated with extracts from the formal specifications. Some of the benefits and problems of using mathematical proof for verification are described in the illustration of the redundancy management example. Author

N92-12458# Sener Ingenieria y Sistemas S.A., Madrid (Spain).
A METHODOLOGY FOR SOFTWARE SPECIFICATION AND DEVELOPMENT BASED ON SIMULATION **c08**
G. FernandezdelaMora, R. Minguez, S. Khan, and J. R. Villa *In* AGARD, Software for Guidance and Control Sep. 1991 5 p (For primary document see N92-12449 03-61)
Copyright Avail: NTIS HC/MF A11; Non-NATO Nationals requests available only from AGARD/Scientific Publications Executive

The methodology is discussed which is presently used for specification and development of guidance and control software (GCS) referred to as the phased approach. This methodology is shown to present basic shortcomings in relation with the requirements specification phase: long development time, reverse engineering tasks, and inadequate handling of errors. In order to solve these problems, a new methodology, the simulation based approach, is presented. This new methodology is based on the fact that any requirements specification for control software is preceded by a simulation task, that includes the design, code, and test of the GCS. As a consequence, the GCS is developed twice, once in the simulation, and then in the flight software. The new methodology proposed to build the GCS only once, and through the use of two basic tools: simulation and rapid prototyping, cuts through the main shortcomings of the phased approach. Author

N92-12459# Forschungsinstitut fuer Funk und Mathematik, Wachtberg (Germany, F.R.).
NETWORK PROGRAMMING: A DESIGN METHOD AND PROGRAMMING STRATEGY FOR LARGE SOFTWARE SYSTEMS
L. Schuberth, J. Kutscher, and W.-J. Gruenewald *In* AGARD, Software for Guidance and Control Sep. 1991 15 p (For primary document see N92-12449 03-61)
Copyright Avail: NTIS HC/MF A11; Non-NATO Nationals requests available only from AGARD/Scientific Publications Executive

Network Programming (NP) is a methodology for the evolutionary development and life cycle support of large data processing systems. It uses a fully decentralized approach. A given DP task is first realized as an operable network of sequential processes, communicating via typed channels. It serves as a base for logical testing, data flow measurements, and assessment of system behavior. Runtime requirements and the mapping of processes to processors are taken care of in a separate final step. A remote procedure call illustrates the concept of a channel's operation mode. The NP method is neither confined to a certain programming language nor to a certain kind of machinery. A short introduction is given to NP and its main features. Then the Network

Programmer's Workbench will be shown in some detail and some of its tools are described. Particular attention is paid to the Network Monitor. An example illustrates the use of these software instruments. Finally, a defense oriented simulation is examined. Author

N92-12460# British Aerospace Dynamics Group, Stevenage (England).
THE DATA ORIENTED REQUIREMENTS IMPLEMENTATION SCHEME
Christine Thomas *In* AGARD, Software for Guidance and Control Sep. 1991 9 p Sponsored in part by Ministry of Defence in the UK (For primary document see N92-12449 03-61)
Copyright Avail: NTIS HC/MF A11; Non-NATO Nationals requests available only from AGARD/Scientific Publications Executive

A need has been identified for a generalized approach to the specification, design, and development of real time embedded systems. There are many tools that cover different parts of the life cycle. Some of these are integrated to various degrees, but for real time systems it is probably true to say that there is not a set of integrated tools which covers all the phases of the life cycle. Described here is the way that the Data Oriented Requirements Implementation Scheme (DORIS) attempts to remedy this situation. Author

N92-12461# Electronic System G.m.b.H., Munich (Germany, F.R.).
PROCESS/OBJECT-ORIENTED Ada SOFTWARE DESIGN FOR AN EXPERIMENTAL HELICOPTER
K. Grambow *In* AGARD, Software for Guidance and Control Sep. 1991 7 p (For primary document see N92-12449 03-61)
Copyright Avail: NTIS HC/MF A11; Non-NATO Nationals requests available only from AGARD/Scientific Publications Executive

Discussed here is the software design method for real-time applications written in Ada. It proves that even time critical systems can be implemented in pure Ada. The design method is based on the Ada tasking model in conjunction with object oriented (OOD) principles. Special purpose graphs, derived from Yourdon/DeMarco data flow diagrams (DFDs), illustrate the method, while Ada program design language (PDL), as a counterpart to the graphs, serves as a basis for the software implementation. No global executive is used to schedule the concurrent threads of execution. Instead, a rendezvous-based interaction of Ada tasks provides the scheduling. This is automatically generated from an Ada compiler. This software design technique is illustrated by the development of the operational flight software for an experimental helicopter. Author

N92-12462# Digital Signal Processing and Control Engineering G.m.b.H., Paderborn (Germany, F.R.).
CODE GENERATION FOR FAST DSP-BASED REAL-TIME CONTROL
H. Hanselmann, A. Schwarte, and H. Henrichfreise *In* AGARD, Software for Guidance and Control Sep. 1991 9 p (For primary document see N92-12449 03-61)
Copyright Avail: NTIS HC/MF A11; Non-NATO Nationals requests available only from AGARD/Scientific Publications Executive

Digital single chip signal processors (DSP) are powerful devices to implement closed-loop controllers for highly dynamic mechanisms. However, code production is not that easy, particularly with DSP offering only fixed-point arithmetic. Described here are key issues and a toolset which builds on automatic code generation to complement existing control design tools so as to close the gap between design and implementation or experiment. Author

N92-12463# Thomson-CSF, Bagneux (France).
COMPUTER AIDED DESIGN OF WEAPON SYSTEM GUIDANCE AND CONTROL WITH PREDICTIVE FUNCTIONAL CONTROL TECHNIQUE
Didier Cuadrado and S. AbuElAtaDoss (Association pour le Developpement de l'Enseignement et de la Recherche en Systematique Appliquee, Verrieres-le-Buisson, Franc) *In* AGARD, Software for Guidance and Control Sep. 1991 16 p (For primary document see N92-12449 03-61)
Copyright Avail: NTIS HC/MF A11; Non-NATO Nationals requests available only from AGARD/Scientific Publications Executive

Predictive Functional Control (PFC), a Mode Based Predictive Control (MBPC) technique, is a control strategy based on the use of a model to predict the process output over a long range time period. This technique, fully compatible with the computer aided design (CAD) based integrated plan, is presented. The link between the specification and the control law tuning parameters is made and the benefits of the use of a CAD tool is demonstrated. Two industrial applications are detailed. The first one concerns the guidance of an air defence short range missile. The second one consists in the control of the two axis turret of a very short range air defence weapon system. Author

N92-12464# Naval Weapons Center, China Lake, CA.
ANALYST WORKBENCH
Thomas F. Reese and Frank Armogida *In* AGARD, Software for Guidance and Control Sep. 1991 12 p (For primary document see N92-12449 03-61)
Copyright Avail: NTIS HC/MF A11; Non-NATO Nationals requests available only from AGARD/Scientific Publications Executive

The Analyst Workbench was developed at the Naval Weapons Center (NWC) to provide analysts with the ability to interactively visualize flight test and simulation results in the study of missile performance and effectiveness. This technology integrates tools and utilities into one software package that not only assists analysts in gathering data, but provides the means to analyze and assimilate the data. The Analyst Workbench helps eliminate the large portion of time analysts now spend just searching for the data so that this valuable time can be spent analyzing the data. Using these technologies to increase personnel productivity and organization communications will ensure the reliability and effectiveness of current and future guidance and control systems throughout the North Atlantic Treaty Organization (NATO). Author

N92-12465# Dassault (E. M.) Co., Saint Cloud (France). Dassault Electronique.
A PRACTICAL EXPERIENCE OF Ada FOR DEVELOPING EMBEDDED SOFTWARE
Christophe Goethals and Claude Grandjean *In* AGARD, Software for Guidance and Control Sep. 1991 4 p (For primary document see N92-12449 03-61)
Copyright Avail: NTIS HC/MF A11; Non-NATO Nationals requests available only from AGARD/Scientific Publications Executive

The general purpose programming language Ada is discussed. Some important reflections are proposed regarding design methods, real-time aspects, and tools needed, considering the experience with combat aircraft embedded software. Author

N92-12466# Royal Aerospace Establishment, Bedford (England). Flight Systems Dept.
THE DEVELOPMENT OF A REQUIREMENT SPECIFICATION FOR AN EXPERIMENTAL ACTIVE FLIGHT CONTROL SYSTEM FOR A VARIABLE STABILITY HELICOPTER: AN Ada SIMULATION IN JSD **c08**
Gareth D. Padfield, Stephen P. Bowater, Roy Bradley, and Alan Moore (LBMS Proprietary Ltd. Co., London, England) *In* AGARD, Software for Guidance and Control Sep. 1991 13 p (For primary document see N92-12449 03-61)
Copyright Avail: NTIS HC/MF A11; Non-NATO Nationals requests available only from AGARD/Scientific Publications Executive

In the field of helicopter flight control and handling qualities, the potential benefits offered by Active Control Technology (ACT) are considerable. The described ATC system include full authority fly by wire actuation and fail-operate/fail-safe hardware architecture. The impact of the required functionality on the systems requirements dictated a need for a precise yet versatile specification of the system, and Jackson System Development (JSD) was selected as a design method since it provides a formal modeling of the pilot interface, and also operates at a sufficient level of detail necessary to ensure completeness and resolution of ambiguities. Author

N92-12467# Lucas Aerospace Ltd., Birmingham (England).
SOFTWARE METHODOLOGIES FOR SAFETY CRITICAL SYSTEMS
W. C. Dolman, A. M. Ashdown, and T. C. Moores (Ministry of Defence, London, England) *In* AGARD, Software for Guidance and Control Sep. 1991 21 p (For primary document see N92-12449 03-61)
Copyright Avail: NTIS HC/MF A11; Non-NATO Nationals requests available only from AGARD/Scientific Publications Executive

UK MOD (PE) identified Ada as a single preferred high level language for the implementation of defence real-time operational systems. UK MOD (PE) decided to invite proposals for the High Order Language Demonstrator (HOLD) to examine the applicability of Ada to aero gas turbine FADEC. The work carried out to date is described. Author

N92-12468# Air Force Armament Lab., Eglin AFB, FL.
COMMON Ada MISSILE PACKAGES (CAMP)
Barry E. Mullins *In* AGARD, Software for Guidance and Control Sep. 1991 6 p (For primary document see N92-12449 03-61)
Copyright Avail: NTIS HC/MF A11; Non-NATO Nationals requests available only from AGARD/Scientific Publications Executive

The Common Ada Missile Packages (CAMP) program is developed to ease the software crisis via a high-payoff remedy - reuse of real-time embedded (RTE) software. CAMP is a pathfinding effort designed to investigate the feasibility of RTE software reuse by actually developing reusable Ada parts, compiler benchmarks, and a parts engineering system. The following topics are described: the genesis of CAMP, structure of the CAMP program, evaluation results, and CAMP products. Author

N92-12469# LITEF, Freiburg (Germany, F.R.).
DEVELOPMENT AND VERIFICATION OF SOFTWARE FOR FLIGHT SAFETY CRITICAL SYSTEMS
H. Afzali and A. Mattissek *In* AGARD, Software for Guidance and Control Sep. 1991 4 p (For primary document see N92-12449 03-61)
Copyright Avail: NTIS HC/MF A11; Non-NATO Nationals requests available only from AGARD/Scientific Publications Executive

In Flight Safety Critical System errors in the Computer Software components can have a catastrophic impact on the safety. For the development of the equipment software, a set of development standards and additional procedures for the implementation of Safety Critical Functions are defined. The standards and procedures were applied for the development of the Inertial Measurement Unit which is a part of the Flight Control System and Seat Sequencer Unit which is part of the Ejection Seat. Some critical technology needs for supporting the development and verification process of such systems and activities which have to be performed during the development phases for identifying, assessing, and eliminating or minimizing hazards in a systematic way are described. Author

N92-12470# National Environmental Satellite Service, Washington, DC.
INTERACTIVE DIGITAL IMAGE DISPLAY AND ANALYSIS SYSTEM (IDIDAS) USER'S GUIDE
Peter J. Celone and William Y. Tseng Oct. 1991 78 p
(NOAA-TR-NESDIS-59) Avail: NTIS HC/MF A05

A sophisticated satellite image display and analysis workstation known as IDIDAS was developed by NESDIS personnel in response to a need for near real time monitoring of environmental events occurring in the U.S. coastal waters. Efficient programming software is merged with an inexpensive personal computer attached to a high resolution color display monitor which gives users the ability to analyze, display, and manipulate digital high resolution imagery obtained from the NOAA series polar orbiting satellites. The purpose of the user's guide is to explain and simplify all IDIDAS commands and functions. A logical sequence is followed of describing the hardware and software necessary for operation, and then the systematic process is described of loading, georectifying, and analyzing satellite imagery. Ancillary functions are also explained. Author

N92-12471# Zak Technologies, Inc., Champaign, IL.
GENERALIZED FINITE ELEMENT GAP MODEL Final Report, Apr. 1986 - Jan. 1987
Adam R. Zak Aug. 1991 59 p
(Contract DAAA15-85-C-0021; DA Proj. 1L1-62618-AH-80)
(AD-A240559; BRL-CR-670) Avail: NTIS HC/MF A04 CSCL 12/5

This report covers a number of topics related to the application of finite element methods to ballistic structural problems. All of these topics are extensions and modifications of finite element formulations and computer codes previously developed in this technical area. The first topic to be discussed involves an extension of so-called gap element formulation. The second topic of this report will deal with another modification to the original gap element formulation. The third topic to be dealt with in this report consists of adding rate-dependent plasticity to the gap computer code. The fourth and the last topic to be discussed involves some preliminary investigation of code combinations. During a number of past investigations, many different but related finite element codes have been developed for ballistic applications. The purpose of the codes is to handle a number of different configurations, material properties, and loading conditions. GRA

N92-12472# Stanford Univ., CA. Systems Optimization Lab.
SOLVING STOCHASTIC LINEAR PROGRAMS ON A HYPERCUBE MULTICOMPUTER
George B. Dantzig, James K. Ho, and Gerd Infanger Aug. 1991 37 p
(Contract N00014-89-J-1659)
(AD-A240630; SU-SOL-91-10) Avail: NTIS HC/MF A03 CSCL 12/6

Large scale stochastic linear programs can be efficiently solved by using a blending of classical Benders decomposition and a relatively new technique called importance sampling. It is demonstrated how such an approach can be effectively implemented on a parallel (Hypercube) multicomputer. Numerical results are presented. GRA

N92-12473# Ecole Nationale Superieure des Telecommunications, Paris (France). Dept. Communications.
JOINT CARRIER PHASE ESTIMATION AND SYMBOLS DECODING OF TRELLIS CODES
Ghassan Kawas-Kaleh Mar. 1991 23 p Presented at the International Symposium on Information Theory, San Diego, CA, Jan. 1990
(TELECOM-Paris-91-C-003; ISSN-0751-1337; ETN-91-90117)
Copyright Avail: NTIS HC/MF A03

The Expectation Maximization (EM) algorithm is used to deduce an iterative method for carrier phase estimation and symbol decoding. The method applies to all trellis based codes. Carrier phase offset and noise variance estimation is based on the maximum likelihood criterion. Iterated estimates are obtained via the maximization of the Kullback-Leibler information measure. The Markovian properties of the encoder state sequence allow the required weighted conditional likelihoods to be calculated by a forward-backward algorithm. The likelihoods, obtained from the EM algorithm at the end of iterations, are used to perform optimum symbol by symbol decisions on information symbols which minimizes the symbol error probability. Simulation results which show rapid convergence are given. ESA

N92-12474# Ecole Nationale Superieure des Telecommunications, Paris (France).
DISPLACEMENT RANKS AND FAST ALGORITHMS Ph.D. Thesis [RANGS DE DEPLACEMENT ET ALGORITHMES RAPIDES]
Francois Desbouvries 1991 250 p In FRENCH
(TELECOM-Paris-91-E-001; ISSN-0751-1353; ETN-91-90120)
Copyright Avail: NTIS HC/MF A11

The modeling of a series of observations by linear predictive least squares method is addressed. This modeling is a field of research in signal processing. The ideas of spread displacement

and constancy of rank displacements are considered. The least squared problem is described along with algorithms by Levinson and Schur for the stationary case. ESA

N92-12475# National Research Council of Canada, Ottawa (Ontario). Div. of Electrical Engineering.
SEGMENTATION OF COMPLEX GEOMETRIC FORMS BY THE CURVATURE METHOD [SEGMENTATION DE FORMES GEOMETRIQUES COMPLEXES PAR LA METHODE DE COURBURES]
Pierre Boulanger Dec. 1989 27 p In FRENCH; ENGLISH summary
(NRC-31210; NRC-ERB-1023; CTN-91-60265) Copyright Avail: NTIS HC/MF A03

This report presents a summary of the initial results of segmentation of range images using Gaussian and mean curvatures sign classification. A new technique to detect edge and orientation discontinuities is described. This technique used morphological operators to compute these discontinuities with good noise immunity. The second part of the report describes how one computes differential geometry properties using a mean-squared variable window technique. The third part describes how to represent segmented images using proximity graphs. Experimental results are also presented and limitations of each method discussed. Author (CISTI)

N92-12476# National Research Council of Canada, Ottawa (Ontario). Div. of Electrical Engineering.
DIRECT ESTIMATION OF DEFORMABLE MOTION PARAMETERS FROM A RANGE IMAGE SEQUENCE
Masanobu Yamamoto (Electrotechnical Lab., Ibaraki, Japan), Pierre Boulanger, J.-A. Beraldin, M. Rioux, and J. Domey Apr. 1990 33 p
(NRC-31757; NRC-ERB-1030; CTN-91-60267) Copyright Avail: NTIS HC/MF A03

This paper describes a method capable of estimating deformable motion parameters of a nonrigid object as well as a rigid object from a sequence of range images. The method can directly estimate the deformable motion parameters by solving a system of linear equations which are obtained by substituting a linear transformation of a nonrigid object expressed by a Jacobian matrix into motion constraints based on an extension of the conventional scheme used in intensity image sequence. The algorithm is supported by experimental estimation of motion parameters of a sheet of paper, a piece of cloth, the movement of human skin, and the motion of a rubber balloon being inflated using real range image sequences acquired by a video-rate range finder. Furthermore, it is shown that by adding intensity image sequence to the range information, one may prevent the equation system from falling into an ill-posed condition. The method has at least two advantages. First, the use of range images enables the estimation of more complicated deformation since they represent the real 3-D shape. Second, even if features can be seen in one image, it does not always mean that they can be seen in another due to the deformation. The present method does not suffer from this limitation since it does not need image feature matching procedures. Author (CISTI)

N92-12477# National Research Council of Canada, Ottawa (Ontario). Div. of Electrical Engineering.
CAD/CAM ACTIVITIES AT NRC: 1988
J. H. C. Scrimgeour, ed. and B. VandenBerg, ed. Jun. 1988 35 p
(NRC-29225; CTN-91-60300) Copyright Avail: NTIS HC/MF A03

This report contains brief descriptions of computer aided design (CAD), computer aided manufacturing (CAM) and computer integrated manufacturing (CIM) activities originating at many National Research Council of Canada (NRCC) divisions. CAD/CAM development projects are underway related to the following applications: use of CIM in adaptive control systems, development of automatic inspection systems, development of control systems for automatically guided vehicles, development of new sensors for autonomous systems, simulation of behavior of materials during processing operations, development of material finishing systems, and application of CAD to creation of highly precise models. Databases have been developed for modelling of material properties, modelling of process and service dependent material properties and processing conditions, and for use with computer aided materials selection, comparison and evaluation of polymers, composites, nonferrous alloys and tool steels. Databases related to numerically controlled machines are also being developed. NRCC divisions are also involved in international standards development relevant to these activities. CISTI

N92-12478# Technische Univ., Berlin (Germany, F.R.). Fachbereich Informatik.
INTEGRATION OF APPLICATIVE AND OBJECT ORIENTED PROGRAMMING Ph.D. Thesis [INTEGRATION APPLIKATIVER UND PROZESSORIENTIERTER PROGRAMMIERUNG]
Gottfried Egger 1991 252 p In GERMAN
(ETN-91-90168) Avail: NTIS HC/MF A12

The Applicative Programming Language (APL) which is developed is completely independent from a concrete machine architecture and describes a very general computation model. Two distinct programming concepts are realized in APL: pure applicative, static value computations; and communicating dynamic processes for describing interactive behavior. The integration of both concepts allows a very flexible and abstract description of algorithms, whose properties can be examined using APL semantics. Experiences with purely applicative language, in particular OPAL, show that abstract concepts are feasibly efficient. ESA

N92-12479# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Operations Research, Statistics, and System Theory.
MORPHOLOGICAL DISCRETIZATION
H. J. A. M. Heijmans Jan. 1991 13 p Presented at the GEOBILD 1991 5th Workshop on Geometrical Problems of Image Processing, Georgenthal, German Democratic Republic, 1991 Submitted for publication Sponsored by Netherlands Organization for the Advancement of Research
(CWI-BS-R9105; ETN-91-90216) Copyright Avail: NTIS HC/MF A03

One of the major goals of mathematical morphology is to provide a collection of algorithms suited for the automatic analysis of digital images on a computer. To a large extent, it relies upon mathematical disciplines such as stereology and integral geometry. Consequently, mathematical morphology is basically a continuous theory; that is, it deals with continuous images. So there is obviously a gap between the continuous mathematical tools which form the basis of morphology and the specific applications, mostly of a discrete nature, for which it has been designed. A solid theory of discretization which can bridge this gap is initiated. ESA

N92-12480# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Computer Science/Dept. of Software Technology.
THE SYNTAX AND SEMANTICS OF MICRO CRL
Jan Friso Groote and Alban Ponse Dec. 1990 38 p Sponsored by Netherlands Organization for Applied Scientific Research TNO and Commission of the European Communities
(CWI-CS-R9076; ETN-91-90217) Copyright Avail: NTIS HC/MF A03

A simple specification language based on Common Representation Language (CRL) and therefore called micro CRL is proposed. It was developed to study processes with data. Thus the language contains only basic constructs with easy semantics. To obtain executability, effective micro CRL was defined. In effective micro CRL equivalence between closed data terms is decidable and the operational behavior is finitely branching and computable. This makes effective micro CRL a good platform for tooling activities. ESA

N92-12481*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
OBSERVATION MODEL AND PARAMETER PARTIALS FOR THE JPL VLBI PARAMETER ESTIMATION SOFTWARE MODEST/1991
O. J. Sovers 1 Aug. 1991 90 p Revised
(Contract NAS7-918)
(NASA-CR-189035; JPL-Publ-83-39-Rev-4; NAS 1.26:189035)
Avail: NTIS HC/MF A05 CSCL 09B

A revision is presented of MASTERFIT-1987, which it supersedes. Changes during 1988 to 1991 included introduction of the octupole component of solid Earth tides, the NUVEL tectonic motion model, partial derivatives for the precession constant and source position rates, the option to correct for source structure, a refined model for antenna offsets, modeling the unique antenna at Richmond, FL, improved nutation series due to Zhu, Groten, and Reigber, and reintroduction of the old (Woolard) nutation series for simulation purposes. Text describing the relativistic transformations and gravitational contributions to the delay model was also revised in order to reflect the computer code more faithfully. Author

N92-12482*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
A GENERAL SOFTWARE RELIABILITY PROCESS SIMULATION TECHNIQUE
Robert C. Tausworthe 1 Apr. 1991 57 p
(Contract NAS7-918)
(NASA-CR-189037; JPL-Publ-91-7; NAS 1.26:189037) Avail: NTIS HC/MF A04 CSCL 09B

The structure and rationale of the generalized software reliability process, together with the design and implementation of a computer program that simulates this process are described. Given assumed parameters of a particular project, the users of this program are able to generate simulated status timelines of work products, numbers of injected anomalies, and the progress of testing, fault isolation, repair, validation, and retest. Such timelines are useful in comparison with actual timeline data, for validating the project input parameters, and for providing data for researchers in reliability prediction modeling. Author

N92-12483# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Computer Science.
EMBEDDING AS A TOOL FOR LANGUAGE COMPARISON
Frank S. deBoer and Catuscia Palamidessi (Pisa Univ., Italy) Jan. 1991 23 p Sponsored by Commission of the European Communities; Dutch Research and Education in Concurrent Systems Project; CNR; and Netherlands Organization for the Advancement of Research
(CWI-CS-R9102; ETN-91-90219) Copyright Avail: NTIS HC/MF A03

The problem of defining a formal tool to compare the expressive power of different concurrent logic languages is addressed. The basic notion of embedding is refined by adding some reasonable conditions, specific for concurrent frameworks. The new notion, called modular embedding, is used to define a preorder among these languages, representing the different degree of their expressivity. It is shown that this preorder is not trivial (i.e., it does not collapse into one equivalence class) by proving that Flat CP cannot be embedded into Flat GHC, and that Flat GHC cannot be embedded into a language without communication primitives in the guards, while the converses hold. ESA

N92-12484# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Computer Science.
PROGRAM CALCULATION PROPERTIES OF CONTINUOUS ALGEBRAS
Maarten M. Fokkinga and Erik Meijer (Nijmegen Univ., Netherlands) Jan. 1991 52 p Sponsored by Netherlands Organization for the Advancement of Research
(CWI-CS-R9104; ETN-91-90221) Copyright Avail: NTIS HC/MF A04

Defining data types as initial algebras, or dually as final co-algebras, is beneficial, if not indispensable, for an algebraic calculus for program construction, in view of the nice equational properties that then become available. It is not hard to render finite lists as an initial algebra and, dually, infinite lists as a final co-algebra. However, this would mean that there are two distinct data types for lists, and then a program that is applicable to both finite and infinite lists is not possible, and arbitrary recursive definitions are not allowed. It is proved that the existence of algebras that are both initial in one category of algebras and final in the closely related category of co-algebras, and for which arbitrary (continuous) fixed point definitions (recursion) do have a solution. Thus, there is a single data type that comprises both the finite and the infinite lists. The price to be paid, however, is that partiality (of functions and values) is unavoidable. For any such data type, various laws that are useful for an algebraic calculus of programs are derived. ESA

N92-12485# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Computer Science.
MODULAR PROPERTIES OF CONDITIONAL TERM REWRITING SYSTEMS
Aart Middeldorp Jan. 1991 45 p Sponsored by Commission of the European Communities and Netherlands Organization for the Advancement of Research
(CWI-CS-R9105; ETN-91-90222) Copyright Avail: NTIS HC/MF A03

A property of term rewriting systems is called modular if it is preserved under disjoint union. For unconditional term rewriting systems, several modularity results are known. The analysis and extension of these results to conditional term rewriting systems is addressed. It turns out that conditional term rewriting is much more complicated than unconditional rewriting from a modularity point of view. For instance, it is shown that the modularity of weak normalization for unconditional term rewriting systems does not extend to conditional term rewriting systems. On the positive side, the extension of Toyama's confluence result for disjoint unions of term rewriting systems to conditional term rewriting systems is mentioned. ESA

N92-12486# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Analysis, Algebra and Geometry.
ON THE CONSTRUCTION OF TRANSLATION AND ROTATION INVARIANT MORPHOLOGICAL OPERATORS
J. B. T. M. Roerdink Dec. 1990 32 p Submitted for publication Sponsored by Netherlands Organization for the Advancement of Research
(CWI-AM-R9025; ETN-91-90224) Copyright Avail: NTIS HC/MF A03

Mathematical morphology in its original form is a theory of binary image transformations which are invariant under the group of Euclidean translations. This has been generalized to the case where the translation group is replaced by an arbitrary commutative group. Morphological operators on the Euclidean space R(n) which are motion invariant, i.e., invariant under translations as well as rotations are constructed. A major problem is that the corresponding invariance group, that is to say the group of Euclidean motions M, is not communicative. A two step approach is followed: first morphological operators on the space P(M) of subsets of the group M itself are constructed; next the results are used to construct morphological operators on the original object space, i.e., the Boolean algebra P(R(n)) of all subsets of R(n). Motion-invariant dilations, erosions, openings, and closings are defined and several representation theorems are presented. Examples and possible applications are discussed. ESA

N92-12487# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Numerical Mathematics.
THREE DIMENSIONAL SHALLOW WATER MODEL ON THE CRAY Y-MP4/464
Erik D. deGoede Mar. 1991 11 p Submitted for publication Sponsored by Rijkswaterstaat and Netherlands Organization for

the Advancement of Research
(CWI-NM-R9106; ETN-91-90231) Copyright Avail: NTIS HC/MF A03

Simulation of three dimensional shallow water flows requires the use of fast computers, along with numerical methods that fully exploit the potential of vector and parallel facilities of these computers. The implementation of such numerical method on the Cray Y-MP4/464, recently installed at the Academic Computing Services Amsterdam (SARA) is discussed. ESA

N92-12488 Politecnico di Milano (Italy). Dipt. di Elettronica.
DBMS PROBLEMS ON THE EVOLUTION OF RELATIONAL MODEL TO OBJECT MODEL [PROBLEMATICHE DEI DBMS NELL'EVOLUZIONE DAL MODELLO RELAZIONALE AL MODELLO AD OGGETTI]
Alberto Coen-Porisini Nov. 1990 21 p In ITALIAN
(Rept-90-069; ETN-91-90249) Avail: Politecnico di Milano, Piazza Leonardo da Vinci 32, 20133 Milan, Italy

The principle problems relative to developing a Data Base Management System (DBMS) based on relational modeling to an object oriented model are adressed. Relational and object models are described. Objected oriented languages and extensions are considered. Problems of OODBS (Object Orientated DBS) are discussed. ESA

N92-12489# Ecole Nationale Superieure des Telecommunications, Paris (France).
ALGORITHMS AND VLSI ARCHITECTURE DESIGNS FOR IMAGE TRANSFORMATION IN REAL TIME Ph.D. Thesis [ETUDE D'ALGORITHMES ET CONCEPTION D'ARCHITECTURE VLSI POUR LES TRANSFORMATIONS D'IMAGES EN TEMPS REEL]
Min Zhao 1990 167 p In ENGLISH and FRENCH
(TELECOM-Paris-90-E-021; ISSN-0751-1353; ETN-91-90278)
Copyright Avail: NTIS HC/MF A08

Geometric transformation of images by rotation and translation or by more complex polynomial or zone transformations is discussed. The coordinates of the previous pixel to the one to be transformed are first of all calculated for all the pixels of the target image. All the coordinates of the target image are scanned for this purpose. A reciprocal function is used to obtain the coordinates of the previous pixel. Interpolation techniques to best estimate the coordinates of the previous pixel are outlined. For individual titles, see N92-12490 through N92-12490.

N92-12490# Laboratoires d'Electronique et de Physique Appliquee, Limeil-Brevannes (France).
REAL-TIME VLSI ARCHITECTURE FOR GEOMETRIC IMAGE TRANSFORMATIONS
Min Zhao, Jean Gobert, Olivier Schirvanian, and Nicolas Demassieux (Ecole Nationale Superieure des Telecommunications, Paris, France) *In* Ecole Nationale Superieure des Telecommunications, Algorithms for Image Transformation in Real Time 1990 p 161-173 Presented at SPIE Conference International and Damage Processing, 3 Oct. 1990 Sponsored by Ministere de la Recherche et de la Technologie (For primary document see N92-12489 03-61)
Copyright Avail: NTIS HC/MF A08

Development of a chip performing a large range of geometric image transformations with third degree polynomials is described. Such transformations are crucial on many applications of image processing such as digitized angiography and scan conversion in medical imaging. The Very Large Scale Integration (VLSI) architecture of the chip is presented. Different problems associated with real time image processing are discussed. Architectural concepts such as local memories combined with incremental calculation on a block and processing by patches are used to overcome these problems. ESA

N92-12491# Loughborough Univ. of Technology (England). Dept. of Mathematical Sciences.
ON A GENERALIZED POLAK-RIBIERE ALGORITHM FOR UNCONSTRAINED MINIMIZATION
K. M. Khoda and C. Storey Jul. 1991 13 p Presented at 14th International Symposium on Mathematical Programming, Amsterdam, Netherlands, 5-9 Aug. 1991
(MATHS-Rept-A-148; ETN-91-90291) Avail: NTIS HC/MF A03

A new conjugate gradient type method, the Generalized Polak-Ribiere (GPR) method was recently developed, for unconstrained minimization. Various implementations of the GPR method are compared with a currently available standard NAG software routine and also with the Nocidal, Buckley-LeNir, and Shanno's limited memory algorithms. The results demonstrate the general effectiveness of the new algorithm. ESA

N92-12492# Sandia National Labs., Albuquerque, NM. Ground Motion and Seismic Div.
AUTHENTICATION OF BYTE SEQUENCES
Samuel D. Stearns Jun. 1991 15 p
(Contract DE-AC04-76DP-00789)
(DE92-000150; SAND-91-1004) Avail: NTIS HC/MF A03

Algorithms for the authentication of byte sequences are described. The algorithms are designed to authenticate data in the Storage, Retrieval, Analysis, and Display (SRAD) Test Data Archive of the Radiation Effects and Testing Directorate (9100) at Sandia National Laboratories, and may be used in similar situations where authentication of stored data is required. The algorithms use a well-known error detection method called the Cyclic Redundancy Check (CRC). When a byte sequence is authenticated and stored, CRC bytes are generated and attached to the end of the sequence. When the authenticated data is retrieved, the authentication check consists of processing the entire sequence, including the CRC bytes, and checking for a remainder of zero. The error detection properties of the CRC are extensive and result in a reliable authentication of SRAD data. DOE

N92-12493# Los Alamos National Lab., NM.
ENHANCED USE OF CLIPS AT THE LOS ALAMOS NATIONAL LABORATORY
K. H. Duerre, W. J. Parkinson, and J. J. Osowski 1991 14 p Presented at the 2nd Annual CLIPS Conference, Houston, TX, 23-25 Sep. 1991
(Contract W-7405-eng-36)
(DE92-000305; LA-UR-91-2887; CONF-9109280-1-Draft) Avail: NTIS HC/MF A03

Early efforts in producing expert systems for engineering applications used a limited subset of C Language Integrated Production System (CLIPS) features. We discuss implementation details of previous expert systems and the current expert system used for training operators in the control of the Isotope Separation System. DOE

N92-12494# Oak Ridge National Lab., TN.
USING COMPUTER EXPERIMENTS TO CONSTRUCT A CHEAP SUBSTITUTE FOR AN EXPENSIVE SIMULATION MODEL
T. Mitchell and M. Morris 1991 6 p Presented at the Interface 1991: Computing Science and Statistics, Seattle, WA, 22-24 Apr. 1991
(Contract DE-AC05-84OR-21400)
(DE92-000421; CONF-9104300-1) Avail: NTIS HC/MF A02

There is widespread use of computer models as tools in scientific research. As surrogates for physical or behavioral systems, such models can be subjected to experimentation, the goal being to predict how the corresponding real system would behave under certain conditions. For long-running (expensive) model codes, there may be a severe limitation on the number of experiments that can reasonably be done. This motivates the construction of a fast-running (cheap) approximation to the original code, for use in experiments where a large number of runs may be necessary. Here we discuss our approximation of a simulation model for the compression molding of sheet molding compound, applied to the manufacture of an automobile hood. The approximation was constructed using Bayesian interpolation methods for prediction of the movement of the flow front. The predictions were based on data generated by a sequence of

computer experiments, using designs chosen according to a type of D-optimality criterion. DOE

N92-12495# California Univ., Berkeley. Lawrence Berkeley Lab.
REVERSE ENGINEERING TOOLS FOR SOFTWARE: A SMALL STUDY
E. H. Harvey, Jr. Oct. 1990 11 p
(Contract DE-AC03-76SF-00098)
(DE92-000650; LBL-30695) Avail: NTIS HC/MF A03

Reverse engineering would ideally reconstruct the design information from existing software. It would ideally populate a forward engineering system that would allow future developments to be done with a higher level tool. By contrast, reverse engineering is done often at the Lawrence Berkeley Laboratory (LBL) by a collection of manual means, such as reading the source codes and talking to experts in those codes, along with some disjointed tools to aid in this process. The following discussion provides some information about the various tools in use at LBL. Most of this information comes from my personal work at LBL, mostly for the Physics Division Time Projection Chamber experiment. This is only a small study. Much more work could and needs to be done in this area. In order to keep the scope limited I will try to stay away from detailed issues such as what type of methodology or technology is best. I know that there are many arguments in favor of the newest and latest technology, just as there are arguments for doing things in the old tried and true methods. DOE

62 COMPUTER SYSTEMS

Includes computer networks and special application computer systems.

N92-12496*# Research Inst. for Advanced Computer Science, Moffett Field, CA.
A HIGHLY PARALLEL MULTIGRID-LIKE METHOD FOR THE SOLUTION OF THE EULER EQUATIONS
Ray S. Tuminaro Dec. 1989 19 p
(Contract NCC2-387)
(NASA-CR-188816; NAS 1.26:188816; RIACS-TR-89-59) Avail: NTIS HC/MF A03 CSCL 09B

We consider a highly parallel multigrid-like method for the solution of the two dimensional steady Euler equations. The new method, introduced as filtering multigrid, is similar to a standard multigrid scheme in that convergence on the finest grid is accelerated by iterations on coarser grids. In the filtering method, however, additional fine grid subproblems are processed concurrently with coarse grid computations to further accelerate convergence. These additional problems are obtained by splitting the residual into a smooth and an oscillatory component. The smooth component is then used to form a coarse grid problem (similar to standard multigrid) while the oscillatory component is used for a fine grid subproblem. The primary advantage in the filtering approach is that fewer iterations are required and that most of the additional work per iteration can be performed in parallel with the standard coarse grid computations. We generalize the filtering algorithm to a version suitable for nonlinear problems. We emphasize that this generalization is conceptually straight-forward and relatively easy to implement. In particular, no explicit linearization (e.g., formation of Jacobians) needs to be performed (similar to the FAS multigrid approach). We illustrate the nonlinear version by applying it to the Euler equations, and presenting numerical results. Finally, a performance evaluation is made based on execution time models and convergence information obtained from numerical experiments. Author

N92-12497*# Research Inst. for Advanced Computer Science, Moffett Field, CA.
NETWORKING AS A STRATEGIC TOOL, 1991
1991 189 p Conference held in Houston, TX, 30 Apr. 1991 Sponsored by NASA. Johnson Space Center
(NASA-CR-188124; NAS 1.26:188124) Avail: NTIS HC/MF A09 CSCL 09B

This conference focuses on the technological advances, pitfalls, requirements, and trends involved in planning and implementing an effective computer network system. The basic theme of the conference is networking as a strategic tool. Tutorials and conference presentations explore the technology and methods involved in this rapidly changing field. Future directions are explored from a global, as well as local, perspective. For individual titles, see N92-12498 through N92-12507.

N92-12498*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.
NETWORKING AT NASA. JOHNSON SPACE CENTER
John R. Garman *In* Research Inst. for Advanced Computer Science, Networking as a Strategic Tool, 1991 1991 12 p (For primary document see N92-12497 03-62)
Avail: NTIS HC/MF A09 CSCL 09B

A series of viewgraphs on computer networks at the Johnson Space Center (JSC) are given. Topics covered include information resource management (IRM) at JSC, the IRM budget by NASA center, networks evolution, networking as a strategic tool, the Information Services Directorate charter, and SSC network requirements, challenges, and status. Author

N92-12499*# Digital Equipment Corp., Houston, TX.
NETWORKING STANDARDS
Mark Davies *In* Research Inst. for Advanced Computer Science, Networking as a Strategic Tool, 1991 1991 26 p (For primary document see N92-12497 03-62)
Avail: NTIS HC/MF A09 CSCL 09B

The enterprise network is currently a multivendor environment consisting of many defacto and proprietary standards. During the 1990s, these networks will evolve towards networks which are based on international standards in both Local Area Network (LAN) and Wide Area Network (WAN) space. Also, you can expect to see the higher level functions and applications begin the same transition. Additional information is given in viewgraph form. Author

N92-12500*# Computer Sciences Corp., Houston, TX.
USING NETMASTER TO MANAGE IBM NETWORKS
Guss Ginsburg *In* Research Inst. for Advanced Computer Science, Networking as a Strategic Tool, 1991 1991 17 p (For primary document see N92-12497 03-62)
Avail: NTIS HC/MF A09 CSCL 09B

After defining a network and conveying its importance to support the activities at the JSC, the need for network management based on the size and complexity of the IBM SNA network at JSC is demonstrated. Network Management consists of being aware of component status and the ability to control resources to meet the availability and service needs of users. The concerns of the user are addressed as well as those of the staff responsible for managing the network. It is explained how NetMaster (a network management system for managing SNA networks) is used to enhance reliability and maximize service to SNA network users through automated procedures. The following areas are discussed: customization, problem and configuration management, and system measurement applications of NetMaster. Also, several examples are given that demonstrate NetMaster's ability to manage and control the network, integrate various product functions, as well as provide useful management information. Author

N92-12501*# Mitre Corp., Houston, TX.
PERFORMANCE ANALYSIS OF LAN BRIDGES AND ROUTERS
Ankur R. Hajare *In* Research Inst. for Advanced Computer Science, Networking as a Strategic Tool, 1991 1991 9 p (For primary document see N92-12497 03-62)
(Contract NAS9-18057)
Avail: NTIS HC/MF A09 CSCL 09B

Bridges and routers are used to interconnect Local Area Networks (LANs). The performance of these devices is important since they can become bottlenecks in large multi-segment

networks. Performance metrics and test methodology for bridges and routers were not standardized. Performance data reported by vendors is not applicable to the actual scenarios encountered in an operational network. However, vendor-provided data can be used to calibrate models of bridges and routers that, along with other models, yield performance data for a network. Several tools are available for modeling bridges and routers - Network II.5 was used. The results of the analysis of some bridges and routers are presented. Author

N92-12502*# Collaborative Technology Corp., Austin, TX.
GROUP DECISION SUPPORT SYSTEMS
Don Petersen *In* Research Inst. for Advanced Computer Science, Networking as a Strategic Tool, 1991 1991 12 p (For primary document see N92-12497 03-62)
Avail: NTIS HC/MF A09 CSCL 09B

Computers are used to support collaboration among members of a business team. The specific application is the augmentation of meetings. The motivation, approach, and empirical results are presented. Author

N92-12503*# Denver Univ., CO. Dept. of Management Information Systems.
COMPUTER CONFERENCING: CHOICES AND STRATEGIES
Jill Y. Smith *In* Research Inst. for Advanced Computer Science, Networking as a Strategic Tool, 1991 1991 9 p (For primary document see N92-12497 03-62)
Avail: NTIS HC/MF A09 CSCL 09B

Computer conferencing permits meeting through the computer while sharing a common file. The primary advantages of computer conferencing are that participants may (1) meet simultaneously or nonsimultaneously, and (2) contribute across geographic distance and time zones. Due to these features, computer conferencing offers a viable meeting option for distributed business teams. Past research and practice is summarized denoting practical uses of computer conferencing as well as types of meeting activities ill suited to the medium. Additionally, effective team strategies are outlined which maximize the benefits of computer conferencing. Author

N92-12504*# VALIC, Houston, TX.
CROSS-FUNCTIONAL SYSTEMS
Mark Lee *In* Research Inst. for Advanced Computer Science, Networking as a Strategic Tool, 1991 1991 11 p (For primary document see N92-12497 03-62)
Avail: NTIS HC/MF A09 CSCL 09B

Many companies, including Xerox and Texas Instruments, are using cross functional systems to deal with the increasingly complex and competitive business environment. However, few firms within the aerospace industry appear to be aware of the significant benefits that cross functional systems can provide. Those benefits are examined and a flexible methodology is discussed that companies can use to identify and develop cross functional systems that will help improve organizational performance. In addition, some of the managerial issues are addressed that cross functional systems may raise and specific examples are used to explore networking's contributions to cross functional systems. Author

N92-12505*# Gupta Technologies, Inc., Callas, TX.
COOPERATIVE PROCESSING DATA BASES
Juzar Hasta *In* Research Inst. for Advanced Computer Science, Networking as a Strategic Tool, 1991 1991 25 p (For primary document see N92-12497 03-62)
Avail: NTIS HC/MF A09 CSCL 09B

Cooperative processing for the 1990's using client-server technology is addressed. The main theme is concepts of downsizing from mainframes and minicomputers to workstations on a local area network (LAN). This document is presented in view graph form. Author

N92-12506*# Houston Univ., TX.
INFORMATION LOGISTICS: A PRODUCTION-LINE APPROACH TO INFORMATION SERVICES **c82**
Dennis Adams and Chee-Seng Lee *In* Research Inst. for Advanced Computer Science, Networking as a Strategic Tool, 1991 1991 27 p (For primary document see N92-12497 03-62)
Avail: NTIS HC/MF A09 CSCL 05B

Logistics can be defined as the process of strategically managing the acquisition, movement, and storage of materials, parts, and finished inventory (and the related information flow) through the organization and its marketing channels in a cost effective manner. It is concerned with delivering the right product to the right customer in the right place at the right time. The logistics function is composed of inventory management, facilities management, communications unitization, transportation, materials management, and production scheduling. The relationship between logistics and information systems is clear. Systems such as Electronic Data Interchange (EDI), Point of Sale (POS) systems, and Just in Time (JIT) inventory management systems are important elements in the management of product development and delivery. With improved access to market demand figures, logisticians can decrease inventory sizes and better service customer demand. However, without accurate, timely information, little, if any, of this would be feasible in today's global markets. Information systems specialists can learn from logisticians. In a manner similar to logistics management, information logistics is concerned with the delivery of the right data, to the ring customer, at the right time. As such, information systems are integral components of the information logistics system charged with providing customers with accurate, timely, cost-effective, and useful information. Information logistics is a management style and is composed of elements similar to those associated with the traditional logistics activity: inventory management (data resource management), facilities management (distributed, centralized and decentralized information systems), communications (participative design and joint application development methodologies), unitization (input/output system design, i.e., packaging or formatting of the information), transportations (voice, data, image, and video communication systems), materials management (data acquisition, e.g., EDI, POS, external data bases, data entry) and production scheduling (job, staff, and project scheduling). Author

N92-12507*# Houston Univ., TX. Information Systems Research Center.
THE BUSINESS CASE FOR CONNECTIVITY **c82**
Dennis Adams and Rudy Hirschheim *In* Research Inst. for Advanced Computer Science, Networking as a Strategic Tool, 1991 1991 31 p (For primary document see N92-12497 03-62)
Avail: NTIS HC/MF A09 CSCL 05B

Information systems that provide competitive advantages to organizations can be broadly classified into those that improve the effectiveness of a business function and those that improve the reach of information in the organization. The latter, organizational connectivity systems, can be categorized as intraorganizational and interorganizational systems. Intraorganization systems provide connectivity to function areas within the business, while interorganizational systems support the exchange of business data between independent business units. These system are not confined to a single entity but span organizational boundaries which can be national or international in scope. A series of case studies was undertaken in an effort to better understand the issues and problems associated with providing an increased flow of information within and outside of an organization. Ten issues emerged from this study. In summary, it is necessary for firms to first consider how effective their internal communications systems are before launching projects that tie the organization to external systems. Author

N92-12508# Office National d'Etudes et de Recherches Aerospatiales, Paris (France). Direction des Moyens d'Informatique.
VECTORIZATION AND PARALLELIZATION OF THE AEROLOG3D CODE IN COLLABORATION WITH MATRA Final Report [VECTORISATION ET PARALLELISATION DU CODE AEROLOG3D EN COLLABORATION AVEC LA MATRA. RAPPORT FINAL]

F. X. Roux Jan. 1990 39 p In FRENCH
(Contract DRET-89-34-001)
(ONERA-RF-37/3479-CY; ETN-91-90088) Avail: NTIS HC/MF A03

The vectorial optimization of AEROLOG3D on CRAY XMP and Cray 2 machines was carried out by ONERA and an engineer from Matra. The results obtained for the parallelization of the explicit code on the Cray 2 are presented. Results of a general study on the methods of resolution by subdomains which led to the parallelization work are presented. ESA

N92-12509# Technische Univ., Berlin (Germany, F.R.). Fachbereich Informatik.
SYNCHRONIZATION OF PARALLEL PROCESSES BY HARDWARE: REALIZATIONS IN ASYNCHRONOUS TECHNIQUE Ph.D. Thesis [SYNCHRONISATION PARALLELER PROZESSE DURCH HARDWARE: REALISIERUNGEN IN ASYNCHRONTECHNIK]
Edgar Mueller 1991 131 p In GERMAN
(ETN-91-90164) Avail: NTIS HC/MF A07

A project method is presented, which uses the parallel graph system for functional system description. Two main solution formulations are developed, which allow event intersections in asynchronous ratchet mechanisms. The project of three parallel graph systems shows the application of solution formulations and the extended time notation, in order to obtain safe system behavior, despite event intersections. Two hardware models show the correspondency of standard times in a parallel graph with locations of deceleration elements for typical sampling functions. A new coding for parallel graphs is presented. Examples show that parallel graph systems are a suitable means of designing asynchronous circuits for the synchronization of parallel processes. ESA

N92-12510# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Computer Science.
PROCESS ALGEBRA WITH SIGNALS AND CONDITIONS
J.C.M. Baeten and J. A. Bergstra (Utrech State Univ., Netherlands) Jan. 1991 45 p Revised Sponsored by Commission of the European Communities and Netherlands Organization for the Advancement of Research
(CWI-CS-R9103; ETN-91-90220) Copyright Avail: NTIS HC/MF A03

Several new operators are introduced on top of the Algebra of Communicating Processes (ACP) in order to incorporate stable signals in process algebra. Semantically this involves assigning labels to nodes of process graphs in addition to the actions that serve as labels of edges. The labels of nodes are called signals. In combination with the operators of Basic Process Algebra (BPA), two signal insertion operators allow the description of each finite tree labeled with actions and signals. In this context of parallel processes, there is a new feature connected with signals: the signal observation mechanism. This mechanism is organized on the basis of a signal observation function in very much the same way as the communication mechanism of ACP is organized around a communication function. Conditionals on signals and processes are also discussed and much use is made of them in the examples. ESA

N92-12511 Politecnico di Milano (Italy). Dipt. di Elettronica.
SOME SIMPLE BOUNDS FOR APPROXIMATIONS OF SIGMOIDAL FUNCTIONS IN LAYERED NEURAL NETS
C. Alippi, S. Bonfanti, and G. StortiGajani 1990 26 p
(Rept-90-022; ETN-91-90241) Avail: Politecnico di Milano, Piazza Leonardo da Vinci 32, 20133 Milan, Italy

Different technologies can be envisioned for the circuital implementation of neural nets. A solution to one of the problems that arise if digital technology is considered, namely that posed by nonlinear output functions, is proposed. In many neural net models the nonlinear function used in each single artificial neuron is the sigmoidal function, a direct realization would require either a ROM (Read Only Memory) table or a series expansion; approximations to this type of function are considered, giving particular attention to the digital VLSI (Very Large Scale Integration) implementation. Step functions and sum of step functions are used, and conditions that assure correct output evaluation in a three layered feed forward nets are given. ESA

N92-12512# Los Alamos National Lab., NM. Military Systems Analysis Group.
AN ASSESSMENT OF THE ModSim/TWOS PARALLEL SIMULATION ENVIRONMENT
David O. Rich and Randy E. Michelsen 1991 17 p Presented at the 1991 Winter Simulation Conference, Phoenix, AZ, Dec. 1991
(Contract W-7405-eng-36)
(DE91-011400; LA-UR-91-1068; CONF-911224-1) Avail: NTIS HC/MF A03

The Time Warp Operating System (TWOS) has been the focus of significant research in parallel, discrete-event simulation (PDES). A new language, ModSim, has been developed for use in conjunction with TWOS. The coupling of ModSim and TWOS is an attempt to address the development of large-scale, complex, discrete-event simulation models for parallel execution. The approach, simply stated, is to provide a high-level simulation-language that embodies well-known software engineering principles combined with a high-performance parallel execution environment. The inherent difficulty with this approach is the mapping of the simulation application to the parallel run-time environment. To use TWOS, Time Warp applications are currently developed in C and must be tailored according to a set of constraints and conventions. C/TWOS applications are carefully developed using explicit calls to the Time Warp primitives; thus, the mapping of application to parallel run-time environment is done by the application developer. The disadvantage to this approach is the questionable scalability to larger software efforts; the obvious advantage is the degree of control over managing the efficient execution of the application. The ModSim/TWOS system provides an automatic mapping from a ModSim application to an equivalent C/TWOS application. The major flaw with the ModSim/TWOS system is it currently exists is that there is no compiler support for mapping a ModSim application into an efficient C/TWOS application. Moreover, the ModSim language as currently defined does not provide explicit hooks into the Time Warp Operating System and hence the developer is unable to tailor a ModSim application in the same fashion that a C application can be tailored. Without sufficient compiler support, there is a mismatch between ModSim's object-oriented, process-based execution model and the Time Warp execution model. DOE

N92-12513# Sandia National Labs., Albuquerque, NM.
REQUIREMENTS FOR A NETWORK STORAGE SERVICE IN A SUPERCOMPUTER ENVIRONMENT
S. M. Kelly 26 Sep. 1991 4 p Presented at the Cray Users Group Conference, Santa Fe, NM, 23-27 Sep. 1991
(Contract DE-AC04-76DP-00789)
(DE92-000245; SAND-91-2116C; CONF-9109276-1) Avail: NTIS HC/MF A01

Sandia National Laboratories has completed a requirements study for a networked mass storage system. The areas of user functionality, network connectivity, and performance were analyzed to determine specifications for a Network Storage Service to operate in a supercomputer environment. DOE

N92-12514# Sandia National Labs., Albuquerque, NM.
NFS(TM), KERBEROS(TM), AND UNICOS(R)
Rena A. Haynes 25 Sep. 1991 6 p Presented at the Cray Users Group Conference, Santa Fe, NM, 23-27 Sep. 1991
(Contract DE-AC04-76DP-00789)
(DE92-000246; SAND-91-2115C; CONF-9109276-3) Avail: NTIS HC/MF A02

The Network File System (NFS) is used in UNIX-based networks to provide transparent file sharing between heterogeneous systems. Although NFS is well-known for being weak in security, it is widely used and has become a de facto standard. This paper examines the user authentication shortcomings of NFS and the approach Sandia National Laboratories has taken to strengthen it with

Kerberos. The implementation on a Cray Y-MP8/864 running UNICOS is described and resource/performance issues are discussed. DOE

N92-12515# Los Alamos National Lab., NM.
NFS AS A USER INTERFACE TO A HIGH-PERFORMANCE DATA SYSTEM
C. W. Mercier 1991 5 p Presented at the ONC/Network File System (NFS) Industry Networking Conference, Santa Clara, CA, 6-8 Oct. 1991
(Contract W-7405-eng-36)
(DE92-000254; LA-UR-91-2923; CONF-9110219-1) Avail: NTIS HC/MF A01

The Network File System (NFS) will be the user interface to a High-Performance Data System (HPDS) being developed at Los Alamos National Laboratory (LANL). HPDS will manage high-capacity, high-performance storage systems connected directly to a high-speed network from distributed workstations. NFS will be modified to maximize performance and to manage massive amounts of data. DOE

63 CYBERNETICS

Includes feedback and control theory, artificial intelligence, robotics and expert systems.

For related information see also *54 Man/System Technology and Life Support.*

N92-12516# Lawrence Livermore National Lab., CA.
THE RADON TRANSFORM FOR DATA REDUCTION, LINE DETECTION, AND ARTIFICIAL NEURAL NETWORK PREPROCESSING
J. P. Fitch May 1990 13 p
(Contract W-7405-eng-48)
(DE90-013521; UCRL-ID-103852) Avail: NTIS HC/MF A03

Initial investigations indicate that the Radon transform can be utilized to reduce two-dimensional image data into substantially smaller feature vectors for detecting line patterns. Rather than traditional spatial-domain texture analysis type algorithms, we propose the use of the crude angle of arrival estimates to extract information about nearly co-linear waveforms. DOE

N92-12517# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France). Avionics Panel.
MACHINE INTELLIGENCE FOR AEROSPACE ELECTRONIC SYSTEMS
Sep. 1991 301 p In ENGLISH and FRENCH Symposium held in Lisbon, Portugal, 13-16 May 1991
(AGARD-CP-499; ISBN-92-835-0628-6) Copyright Avail: NTIS HC/MF A14; Non-NATO Nationals requests available only from AGARD/Scientific Publications Executive

The papers presented at the Avionics Panel Symposium are compiled. The results of efforts applying Machine Intelligence (MI) technology to aerospace electronic applications are discussed. The symposium focused on application research and development to determine the types of MI paradigms which are best suited to the wide variety of aerospace electronic applications. For individual titles, see N92-12518 through N92-12544.

N92-12518# Rome Air Development Center, Griffiss AFB, NY.
MACHINE INTELLIGENCE FOR SURVIVABLE COMMUNICATIONS NETWORK MANAGEMENT
Nick P. Kowalchuk *In* AGARD, Machine Intelligence for Aerospace Electronic Systems Sep. 1991 7 p (For primary document see N92-12517 03-63)
Copyright Avail: NTIS HC/MF A14; Non-NATO Nationals requests available only from AGARD/Scientific Publications Executive

The development of communication networking technologies that increase the survivability of services provided to military users was an important goal in Air Force programs over the past several years. This enhanced survivability is a result of work that focused on two areas: the development of more robust communication equipment, and the development of a management system that coordinate the use of this equipment. The role of machine intelligence in the design of such a network management system is discussed. Emphasis is placed on the intelligent network management decision making capabilities that are required in a military environment, and the design tradeoffs which must be made in developing a system that can optimize the system-wide use of resources without the need of human intervention. Author

N92-12519# Rome Air Development Center, Griffiss AFB, NY.
A DISTRIBUTED ENVIRONMENT FOR TESTING COOPERATING EXPERT SYSTEMS
Jeffrey D. Grimshaw *In* AGARD, Machine Intelligence for Aerospace Electronic Systems Sep. 1991 11 p (For primary document see N92-12517 03-63)
Copyright Avail: NTIS HC/MF A14; Non-NATO Nationals requests available only from AGARD/Scientific Publications Executive

The Advanced Artificial Intelligence Technology Testbed (AAITT) is discussed. Its purpose is to provide a powerful environment for integrating dissimilar software systems including expert systems, conventional software, databases, and simulations distributed over a network. It also will provide measurement and analysis tools for evaluating the results of the various user-supplied software components. The AAITT will be based on the ABE (A Better Environment) module-oriented system and on the Cronus distributed computing environment. This will allow the various components to communicate transparently over a heterogeneous network. Generic database and simulation capabilities will be provided to support the development, integration, and testing of new software components. Author

N92-12520# Rome Air Development Center, Griffiss AFB, NY.
HEURISTIC ROUTE OPTIMIZATION: A MODEL FOR FORCE LEVEL ROUTE PLANNING
Janet L. Barboza *In* AGARD, Machine Intelligence for Aerospace Electronic Systems Sep. 1991 6 p (For primary document see N92-12517 03-63)
Copyright Avail: NTIS HC/MF A14; Non-NATO Nationals requests available only from AGARD/Scientific Publications Executive

A major shortcoming of tools and methods currently employed for route planning is that they do not incorporate force-level factors, or, if they do, the representation is inadequate. Many important factors necessary for approaching the best possible route are ignored. Heuristic Route Optimization, or HERO, is a model for automated route generation for force-level mission planning. Object Oriented techniques and a dynamic threat representation allow detailed analysis of multiple planning variables in producing effective, survivable mission plans. Author

N92-12521# Aerospace Corp., Sunnyvale, CA. **c18**
ADVANCED SATELLITE WORKSTATION (ASW)
T. E. Bleier, S. Hollander, and S. Sutton *In* AGARD, Machine Intelligence for Aerospace Electronic Systems Sep. 1991 8 p (For primary document see N92-12517 03-63)
Copyright Avail: NTIS HC/MF A14; Non-NATO Nationals requests available only from AGARD/Scientific Publications Executive

The ASW's goal was to evaluate the utility of expert systems in military satellite testing operations. It quickly became apparent, however, that the rule base was too limited. This project's goal was then modified to capture as much of the factory and flight experience as possible in an electronic, updateable medium. The resulting electronic library would then permit much deeper insight into the satellite's operation and more confidence in understanding and expanding the expert system rule base. Author

N92-12522# Phillips Lab., Kirkland AFB, NM.
A SYNERGISTIC APPROACH TO REASONING FOR AUTONOMOUS SATELLITES
James M. Skinner and George F. Luger (New Mexico Univ., Albuquerque.) *In* AGARD, Machine Intelligence for Aerospace Electronic Systems Sep. 1991 8 p (For primary document see N92-12517 03-63)

Copyright Avail: NTIS HC/MF A14; Non-NATO Nationals requests available only from AGARD/Scientific Publications Executive

Based on our earlier research, we are convinced that the best way to approach problem solving tasks is not through any single method of reasoning, but by a method that will allow several reasoning methods to be blended together. The thrust of this effort is to develop a synergistic approach to reasoning that will allow a system to rely on multiple reasoning methodologies, thus benefiting from the strength of each of the reasoning methods, while minimizing their respective weakness. The following steps are discussed that were taken towards developing such a system: (1) the categorization of reasoning methods; (2) the selection of reasoning approaches to blend; (3) design of a framework to blend the systems; and (4) proposed tasks to investigate the result.

Author

N92-12523# Canadian Space Agency, Ottawa (Ontario). Computer and Intelligent Systems Group.

SPACECRAFT ELECTRICAL POWER SYSTEM FAULT DETECTION/DIAGNOSIS AND RESOURCE MANAGEMENT **c20**

Peter J. Adamovits and Eric Jackson (International Submarine Engineering Ltd., Port Coquitiam, British Columbia) *In* AGARD, Machine Intelligence for Aerospace Electronic Systems Sep. 1991 11 p (For primary document see N92-12517 03-63)

Copyright Avail: NTIS HC/MF A14; Non-NATO Nationals requests available only from AGARD/Scientific Publications Executive

The domain of Electrical Power Systems (EPS) for Radar Spacecraft and its effects on the design of AI-based systems for health monitoring and resource management are discussed. Work on EPS Fault Handling and Resource Planning is presented. The Fault Handling System relies on model-based reasoning techniques, while the Resource Planning System relies on case-based reasoning techniques. The two systems perform their functions in a cooperative way and are distributed over both ground-based and space-based processing elements. Author

N92-12524# British Aerospace Public Ltd. Co., Preston (England). Software Technology Dept.

TACAID: A KNOWLEDGE BASED SYSTEM FOR TACTICAL DECISION MAKING

K. Roberts *In* AGARD, Machine Intelligence for Aerospace Electronic Systems Sep. 1991 6 p (For primary document see N92-12517 03-63)

Copyright Avail: NTIS HC/MF A14; Non-NATO Nationals requests available only from AGARD/Scientific Publications Executive

TACAID (TACtical AID) is a research tool to explore the use of AI idea in Mission Management Aids and investigate the potential benefits of coupling between AI and more convenient modules. TACAID is developed using the tool MUSE, a blackboard based system which possesses many of the generic features used in AI, namely: object oriented knowledge representation; object hierarchy; object relations; forward production rules; backward chaining goals; symbolic list manipulation; and knowledge source scheduling.

Author

N92-12525# Mission Research Corp., Santa Barbara, CA.

AUTOMATED THREAT RESPONSE RECOMMENDATION IN ENVIRONMENTS OF HIGH DATA UNCERTAINTY USING THE COUNTERMEASURE ASSOCIATION TECHNIQUE (CMAT) **c32**

George B. Chapman, Glenn Johnson, and Robert Burdick *In* AGARD, Machine Intelligence for Aerospace Electronic Systems Sep. 1991 12 p (For primary document see N92-12517 03-63)

(Contract F33657-89-C-2175)

Copyright Avail: NTIS HC/MF A14; Non-NATO Nationals requests available only from AGARD/Scientific Publications Executive

The CounterMeasure Association Technique (CMAT) is discussed which was developed for the Air Force, and is used to automatically recommend countermeasure and maneuver response to a pilot while he is under missile attack. The overall system is discussed, as well as several key technical components. These components include use of fuzzy sets to specify data uncertainty, use of mimic nets to train the CMAT algorithm to make the same resource optimization tradeoffs as made in a data base of library of training scenarios, and use of several data compression techniques to store the countermeasure effectiveness data base.

Author

N92-12526# Lockheed Canada, Inc., Sittsville (Ontario).

FUTURE ESM SYSTEMS AND THE POTENTIAL FOR NEURAL PROCESSING **c32**

Arthur G. Self and Gregory P. Bourassa *In* AGARD, Machine Intelligence for Aerospace Electronic Systems Sep. 1991 10 p (For primary document see N92-12517 03-63)

Copyright Avail: NTIS HC/MF A14; Non-NATO Nationals requests available only from AGARD/Scientific Publications Executive

The projected radar electromagnetic environments (eme) for the future include: higher pulse densities; frequencies to 40 GHz and higher; stable, jittered, staggered and pseudo-random pulse repetition intervals (PRIs) with multiple frequencies; spread spectrum techniques; multiple agile radar beams and multimode missile seekers. Electronic Support Measures (ESM) concerns the passive detection and identification of radar signals. Thus, an ESM system which can measure such signal characteristics will most likely flood its main processor with information to such an extent that it may not be able to cope. A number of likely solutions exist ranging from special purpose hardware to new processing techniques. A radically different processing approach is reviewed, namely that of neural networks. The likely applicability is indicated of a neural processing approach to a range of ESM functions together with results from some preliminary proof of concept investigations. Author

N92-12527# Smiths Industries Aerospace and Defense Systems, Inc., Grand Rapids, MI.

NEURAL NETWORK SOLUTIONS TO MATHEMATICAL MODELS OF PARALLEL SEARCH FOR OPTIMAL TRAJECTORY GENERATION

Lyle A. Reibling *In* AGARD, Machine Intelligence for Aerospace Electronic Systems Sep. 1991 9 p (For primary document see N92-12517 03-63)

Copyright Avail: NTIS HC/MF A14; Non-NATO Nationals requests available only from AGARD/Scientific Publications Executive

Research was performed in neural network technology for vehicle management system applications of optimal trajectory generation in embedded systems. The problem and solution method is described in envisioning massively parallel architectures which incorporate mathematical physics models for trajectory generation applications. A difficult problem in search applications is computing the optimal aircraft trajectory in real time onboard an aircraft, where the objective is to increase the aircraft survivability and mission effectiveness by penetrating enemy threats and minimizing threat radar exposure. The mathematical model which is the basis for the architecture is based on an application of electrostatic field theory. It describes the problem of finding the best path through a region which contains a variable cost function as a problem in mathematical physics. This research studied computer architecture and algorithms characterized by massive parallelism which can solve trajectory generation problems. Author

N92-12528*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, CA.

A NASA/RAE COOPERATION IN THE DEVELOPMENT OF A REAL-TIME KNOWLEDGE BASED AUTOPILOT

Colin Daysh, Malcolm Corbin, Geoff Butler, Eugene L. Duke, Steven D. Belle, and Randal W. Brumbaugh (PRC Systems Services Co., Edwards, CA.) *In* AGARD, Machine Intelligence for Aerospace Electronic Systems Sep. 1991 10 p Sponsored in part by Ministry of Defence (For primary document see N92-12517 03-63)

Copyright Avail: NTIS HC/MF A14; Non-NATO Nationals requests available only from AGARD/Scientific Publications Executive CSCL 01C

As part of a US/UK cooperative aeronautical research program,

a joint activity between NASA-Ames and the Royal Aerospace Establishment on Knowledge Based Systems (KBS) was established. This joint activity is concerned with tools and techniques for the implementation and validation of real-time KBS. The proposed next stage of the research is described, in which some of the problems of implementing and validating a Knowledge Based Autopilot (KBAP) for a generic high performance aircraft will be studied. Author

N92-12529# Wright Lab., Wright-Patterson AFB, OH.
ADAPTIVE TACTICAL NAVIGATION PROGRAM **c04**
Sandra L. Berning and Douglas P. Glasson (Analytic Sciences Corp., Reading, MA.) *In* AGARD, Machine Intelligence for Aerospace Electronic Systems Sep. 1991 15 p (For primary document see N92-12517 03-63)
Copyright Avail: NTIS HC/MF A14; Non-NATO Nationals requests available only from AGARD/Scientific Publications Executive

The Adaptive Tactical Navigation (ATN) system is a lab prototype which incorporates knowledge based software designed to perform navigation system management and decision aiding for the next generation of combat aircraft. The purpose of the ATN system is to manage a future multisensor navigation suite, dynamically selecting the most appropriate navigation equipment to use in accordance with mission goals, mission phase, threat environment, equipment health, equipment availability, and battle damage. The ATN system encompasses functions as diverse as sensor data interpretation, diagnosis, and navigation resource planning. Author

N92-12530# Dayton Univ., OH.
LOCALLY LINEAR NEURAL NETWORKS FOR AEROSPACE NAVIGATION SYSTEMS **c04**
Steven C. Gustafson and Gordon R. Little *In* AGARD, Machine Intelligence for Aerospace Electronic Systems Sep. 1991 8 p (For primary document see N92-12517 03-63)
Copyright Avail: NTIS HC/MF A14; Non-NATO Nationals requests available only from AGARD/Scientific Publications Executive

Neural network software simulations for the representation and prediction of aircraft inertial navigation system (INS) data were developed. These simulations were evaluated using flight test data that sampled INS outputs at a standard rate for neural network testing and at half this rate for neural network training. The simulations used both locally linear neural networks and backpropagation trained neural networks. Locally linear neural networks have several desirable properties for this application, including interpolation of the training data and representation of linear relationships. For the flight test data, two milliradian testing accuracy was generally achieved with five successive and prior INS heading, pitch, and roll increments as inputs. Author

N92-12531# Wright Lab., Wright-Patterson AFB, OH.
PILOT'S ASSOCIATE: EVOLUTION OF A FUNCTIONAL PROTOTYPE **c06**
Carl S. Lizza, Sheila B. Banks, and Michael A. Whelan *In* AGARD, Machine Intelligence for Aerospace Electronic Systems Sep. 1991 12 p (For primary document see N92-12517 03-63)
Copyright Avail: NTIS HC/MF A14; Non-NATO Nationals requests available only from AGARD/Scientific Publications Executive

The Pilot's Associate Program has completed its first phase of functional development which included two significant program milestones. The early successful development of complex, knowledge based, decision aiding systems allowed the program to shift focus to a more near term, embedded avionics application of the technology. This change in philosophy forced an evolution away from a program designed to explore artificial intelligence without processing bounds, towards a more consistent with, and constrained by, the realities of an avionics processing architecture of an actual aircraft. One of the developmental approaches is focused on, the technical progress made through this phase of the program, and the accomplishments and disappointments with the design approach. Lastly, a brief look into the lessons learned as artificial intelligence technology was applied to a dynamic and complicated domain is presented. Author

N92-12532# British Aerospace Public Ltd. Co., Preston (England).
DEVELOPMENT OF TACTICAL DECISION AIDS **c06**
W. G. Semple *In* AGARD, Machine Intelligence for Aerospace Electronic Systems Sep. 1991 6 p (For primary document see N92-12517 03-63)
Copyright Avail: NTIS HC/MF A14; Non-NATO Nationals requests available only from AGARD/Scientific Publications Executive

British Aerospace is pursuing a program of research and development of computer aids (mission management aids) to assist the pilot in the management of combat missions. In addition to algorithms, many aids will have to exploit new concepts from software engineering to artificial intelligence. We have these new tools by which we expect that we can meet the new requirements. However, many of the conventional solutions are new to our experience, at least within the stringent requirements of real-time airborne computing, and many of the new tools are only partly developed or partly understood. This is especially true for some tactical MMAs. Author

N92-12533# Royal Aerospace Establishment, Farnborough (England). Mission Management Aid Project.
INTEGRATING MACHINE INTELLIGENCE INTO THE COCKPIT TO AID THE PILOT **c54**
E. J. Lovesey and R. I. Davis *In* AGARD, Machine Intelligence for Aerospace Electronic Systems Sep. 1991 8 p (For primary document see N92-12517 03-63)
Copyright Avail: NTIS HC/MF A14; Non-NATO Nationals requests available only from AGARD/Scientific Publications Executive

Combat aircraft of the 21st Century will have to be increasingly well-equipped to counter the future threat, which itself will have become far more potent. This spiralling system complexity will result in unacceptably high cockpit workloads unless some form of automation is provided to aid the pilot. United Kingdom industry and government combined to form a joint venture team to develop a Mission Management Aid which will assist the aircrew throughout the mission. Outlined here are some of the problems to be overcome and some suggestions regarding the major functional areas which will constitute the Mission Management Aid. Author

N92-12534# Naval Air Development Center, Warminster, PA.
AI FOR RPVs, SENSOR DRIVEN AIRBORNE REPLANNER (SDAR), FOR A ROBOTIC AIRCRAFT SENSOR PLATFORM (RASP) **c05**
R. M. Williams and J. J. Davidson *In* AGARD, Machine Intelligence for Aerospace Electronic Systems Sep. 1991 6 p (For primary document see N92-12517 03-63)
Copyright Avail: NTIS HC/MF A14; Non-NATO Nationals requests available only from AGARD/Scientific Publications Executive

The Robotic Aircraft Sensor Platform (RASP) simulation developed at the Naval Air Development Center in Warminster, PA. is described. A hardware and associated software architecture was developed to use on-board sensor information for high level artificial intelligence (AI) decision making. The decisions then direct the flight path of the aircraft and camera gimbal through complex environments. This project has produced a system architecture that breaks the bottleneck of flyable real time AI control systems. The work has transitioned into three new efforts: a flight test effort for the Unmanned Air Vehicle Joint Program Office; an investigation into the use of SDAR for novel systems of sensors and platforms such as the Tactical Imaging System, and a study of applying this technology to manned platforms to assist human operators. Author

N92-12535# Messerschmitt-Boelkow-Blohm G.m.b.H., Munich (Germany, F.R.). Military Aircraft Div.
A THREAT MANAGEMENT SYSTEM **c06**
K. Holla and B. Benninghofen *In* AGARD, Machine Intelligence for Aerospace Electronic Systems Sep. 1991 6 p (For primary document see N92-12517 03-63)
Copyright Avail: NTIS HC/MF A14; Non-NATO Nationals requests available only from AGARD/Scientific Publications Executive

The Threat Management System (TMS) is a company prototype

development of a support system for the crew of fighter bombers at low level flight. In particular, TMS is supposed to provide support in high dense groundbased air defence scenarios during the preparation phase, the penetration phase, and the attack phase of a mission, applying methods of terrain and threat avoidance combined with sensor information fusion. Author

N92-12536# Messerschmitt-Boelkow-Blohm G.m.b.H., Munich (Germany, F.R.). Military Aircraft Div.
EXPERT SYSTEM FOR THE TORNADO GROUND-BASED CHECK-OUT SYSTEM **c06**
J. Fey, J. Marangos, M. Merx, and W. Mansel *In* AGARD, Machine Intelligence for Aerospace Electronic Systems Sep. 1991 5 p (For primary document see N92-12517 03-63)
Copyright Avail: NTIS HC/MF A14; Non-NATO Nationals requests available only from AGARD/Scientific Publications Executive

A technology demonstrator, supporting the TORNADO check-out system for aircraft was developed and tested. The expert system, called TORRES (TORNADO Radar Readiness Expert System), supports debriefing staff with various levels of experience. The scope of the error detection encompasses the TORNADO Terrain Following and Ground Mapping Radar system down to the module level. The main task of TORRES is the identification and isolation of errors that occurred during the previous flight. The expert system is also able to exclude errors that were generated by other systems capable of changing the state of the radar system and isolate the cause. Other influences, like EMC, exceeding avionic systems acceleration limits, and weather effects are taken under consideration and reported. If an error run is left without an associated case, special test runs are suggested. An explanation facility generates detailed debriefing reports. Author

N92-12537# Intelligent Electronics, Tel Aviv (Israel).
USING AITEST TO TROUBLESHOOT A RADAR MODULATOR (RM) UNIT: A CASE STUDY IN THE APPLICATION OF EXPERT SYSTEMS TO INTERMEDIATE-LEVEL TESTING **c32**
Moshe Ben-Bassat (Tel-Aviv Univ., Israel), Daphna Ben Arie, Israel Beniaminy, Jonathan Cheifetz, Michal Eshel, Noam Fogel, Yael Karov, Irene Menkin, Mordechai Sela, and Michal Shalev et al *In* AGARD, Machine Intelligence for Aerospace Electronic Systems Sep. 1991 8 p (For primary document see N92-12517 03-63)
Copyright Avail: NTIS HC/MF A14; Non-NATO Nationals requests available only from AGARD/Scientific Publications Executive

AITEST is a real life expert system designed to serve as a decision aid and productivity tool for test engineers and technicians. Oriented for the functional level, AITEST is designed to troubleshoot large scale UUT's (Unit Under Test) that contain analog, digital, and mechanical modules in electronic, electrooptic, hydraulic, or mechanical systems and devices. Described here is a typical application of AITEST in an intermediate level manitenance facility. The UUT discussed is a radar modulator embedded in the radar system of a military aircraft. Author

N92-12538# National Aerospace Lab., Amsterdam (Netherlands).
A KNOWLEDGE-BASED ASSISTANT FOR DIAGNOSIS IN AIRCRAFT MAINTENANCE **c01**
M. A. Piers and J. C. Donker *In* AGARD, Machine Intelligence for Aerospace Electronic Systems Sep. 1991 7 p (For primary document see N92-12517 03-63)
Copyright Avail: NTIS HC/MF A14; Non-NATO Nationals requests available only from AGARD/Scientific Publications Executive

A feasibility study on the application of knowledge based systems for diagnosis of complaints in aircraft systems is described. The specific application selected for the Knowledge-based Assistant for Diagnosis in Aircraft Maintenance (KADAM) Project is a knowledge based system to be used by ground engineers for troubleshooting of an aircraft air conditioning system. The approach is addressed, and the results, including the design of the proof-of-concept system, are reviewed. Particular attention is paid to the identification and formalization of methods for diagnosis. Author

N92-12539# Wright Lab., Wright-Patterson AFB, OH.
INTEGRATED COMMUNICATIONS, NAVIGATION, IDENTIFICATION, AVIONICS (ICNIA) EXPERT SYSTEM FOR FAULT TOLERANT AVIONICS **c06**
Mark E. Minges *In* AGARD, Machine Intelligence for Aerospace Electronic Systems Sep. 1991 15 p (For primary document see N92-12517 03-63)
Copyright Avail: NTIS HC/MF A14; Non-NATO Nationals requests available only from AGARD/Scientific Publications Executive

Embedded avionic systems for aircraft are becoming increasingly more complex. Very High Speed Integrated Circuits (VHSIC) and semi-custom devices are used to gain many-fold increases in processing power and capability. Mission and operational requirements dictate a high availability and fault detection capability defined quantitatively as 98 percent detection of all faults and isolation of 90 percent of those faults to a line replaceable module (LRM), or 95 percent of the faults to two LRM's. The Integrated Communications, Navigation, Identification Avionics (ICNIA) Program utilizes a module maintenance node (MN) which aids high speed testing of the LRM, and gives the ability to isolate the fault(s) to one or more modules. The MN uses the concepts of set scan design, pseudo-random test vector generation, output response compression, and separate set scan loops to test the small scale integration-medium scale integration logic on the LRM. The resultant data is made available to the expert system within ICNIA so that real-time fault detection and isolation can be achieved. The objective of the expert system within ICNIA is to detect and isolate faults in near real-time and minimize the false alarm rate. Other aspects of the system are addressed. Author

N92-12540# Wright Lab., Wright-Patterson AFB, OH.
A DEVELOPMENT-MEMORY APPROACH FOR ENHANCING AVIONICS SOFTWARE LOGISTICS **c06**
Marc J. Pitarys *In* AGARD, Machine Intelligence for Aerospace Electronic Systems Sep. 1991 5 p (For primary document see N92-12517 03-63)
Copyright Avail: NTIS HC/MF A14; Non-NATO Nationals requests available only from AGARD/Scientific Publications Executive

Advanced avionics systems will execute Ada software on multiple parallel computers. The size and complexity of the avionics software will be massive. Of particular importance is how the software will be supported once it is delivered to the Air Force. Software support is that part of the avionics software life-cycle that deals with the correction of deficiencies and the addition of enhancements to the avionics software. Much of the time spent by personnel is information searching and inferencing. These tasks are made more complicated when information that was useful to the developer is not included in the software documentation that is delivered with the weapon system. The challenges facing avionics software support personnel are covered, and an advanced software support concept called Development-Memory (DM) is addressed. Author

N92-12541# Rome Air Development Center, Griffiss AFB, NY.
C3I GRAPHICAL APPLICATIONS **c32**
Earl C. LaBatt, Jr. *In* AGARD, Machine Intelligence for Aerospace Electronic Systems Sep. 1991 11 p (For primary document see N92-12517 03-63)
Copyright Avail: NTIS HC/MF A14; Non-NATO Nationals requests available only from AGARD/Scientific Publications Executive

Past research efforts in the field of command, control, communications, and intelligence (C3I), have concentrated on the application and refinement of advanced artificial intelligence (AI) concepts. However, the man-machine interface to these advanced applications has experienced little improvement and does not adequately reflect some of the AI concepts embedded within these systems. The development of more advanced computing techniques requires a more sophisticated interface to the system. These enhancements cannot be adequately conceived by a user using traditional display techniques. The underlying AI concepts that help facilitate the transfer of information between acquired C3I data and an operator are revealed. Many of these concepts are discussed in regard to their application in current Tactical Air

Force Research Projects. In addition, the limitations of previous program interfaces and the current advances in graphical interface techniques are discussed. The focus is on two decision aid systems that incorporate several AI concepts: the Tactical Expert Mission Planner (TEMPLAR) and the Identification of Command and Control Operations Nodes (ICON). Author

N92-12542# Wright Lab., Wright-Patterson AFB, OH.
ENGINEERING GRAPHICAL ANALYSIS TOOL (EGAT) DEVELOPMENT PROGRAM
Victor R. Clark and Joseph R. Diemunsch *In* AGARD, Machine Intelligence for Aerospace Electronic Systems Sep. 1991 10 p (For primary document see N92-12517 03-63)
Copyright Avail: NTIS HC/MF A14; Non-NATO Nationals requests available only from AGARD/Scientific Publications Executive

The Air Force Avionics Laboratory has sponsored many efforts to develop real-time Artificial Intelligence (AI) systems. One of these systems, the Adaptive Tactical Navigation (ATN) Program, developed a prototype system to intelligently control a future tactical fighter's integrated navigation sensors. ATN was developed using a distributed communicating expert object architecture called the Activation Frame (AF). Using the AF architecture, ATN was able to achieve real-time execution. Real-time execution was primarily achieved due to the AF's distributed control scheme which eliminates many of the bottlenecks associated with centralized schedulers. Unfortunately, with these increased benefits, there is increased complexity associated with correctly setting the distributed control parameters. The Engineering Graphical Analysis Tool (EGAT) was developed to overcome these limitations by providing a user friendly, graphical AF development tool. EGAT provides the capability to dynamically monitor and modify the AF control parameters. The AF architecture, and the development and implementation of the EGAT are described. The EGAT system is used to dynamically monitor and modify the decentralized control parameters of the AF architecture, a communicating expert object paradigm. Author

N92-12543# Acquired Intelligence, Inc., Victoria (British Columbia).
A KNOWLEDGE-BASED INTELLIGENT TUTORING SYSTEM: ACQUIRE (TM)-ITS **c80**
B. A. Schaefer, R. Side, R. Wagstaff, O. Magusin, and I. R. Morrison *In* AGARD, Machine Intelligence for Aerospace Electronic Systems Sep. 1991 6 p (For primary document see N92-12517 03-63)
Copyright Avail: NTIS HC/MF A14; Non-NATO Nationals requests available only from AGARD/Scientific Publications Executive

An automated knowledge acquisition system and expert system shell known as ACQUIRE was developed. A project was undertaken to extend the ACQUIRE system for uses as a domain independent, knowledge-based Intelligent Tutoring System (ITS). The purpose was to provide the tools that would enable corporate or governmental personnel to rapidly develop their own expert system knowledge bases and rapidly develop their own expert system knowledge bases and rapidly convert these knowledge bases for use in task/case oriented training. Emphasis was on providing tools that would enable computer users, rather than computer professionals, to develop the training packages. This extension to ACQUIRE has involved the development of two major modules: the curriculum author module; and the tutoring module. Using the curriculum author module experts or instructors are able to develop a curriculum composed of lessons in a case study approach. The tutoring module monitors a student's progress in solving cases and constructs a representation of the student's growing knowledge as a naive ACQUIRE knowledge base. The tutoring module gradually merges the student's naive knowledge base with the expert's by identifying incorrect rules, gaps in the knowledge, and, most importantly, poor structuring of the knowledge which indicates misconceptions about how knowledge should be used. ACQUIRE-ITS is written in the C programming language for execution on personal computers running MS-DOS or UNIX. The system has an x-window interface and incorporates hypermedia. Author

N92-12544# National Aerospace Lab., Amsterdam (Netherlands).
REASONING WITH UNCERTAIN AND INCOMPLETE INFORMATION IN AEROSPACE APPLICATIONS
J. C. Donker *In* AGARD, Machine Intelligence for Aerospace Electronic Systems Sep. 1991 16 p (For primary document see N92-12517 03-63)
Copyright Avail: NTIS HC/MF A14; Non-NATO Nationals requests available only from AGARD/Scientific Publications Executive

In many real-life application areas such as aerospace, decisions have to be made based on imperfect knowledge. If decision makers are to be supported by computer systems, it is desirable that this type of knowledge can be represented. Methods have been developed to represent various kinds of imperfections, such as incompleteness, inexactness, or uncertainty. The development of methods to represent and reason with uncertain or incomplete information is studied. The applicability of the Dempster-Shafer Theory is investigated. Parts of the initiation and identification problems in multi-radar tracking are modeled, and the application is described. It is shown that the Dempster-Shafer Theory promises improvements over the Bayesian approach; however, the latter theory is currently more advanced than the former. Author

N92-12545# Technische Univ., Eindhoven (Netherlands).
ROBUSTNESS OF FEEDBACK STABILIZATION: A TOPOLOGICAL APPROACH Ph.D. Thesis
Si Quan Zhu 1991 80 p
(ETN-91-90142) Avail: NTIS HC/MF A05

A compact and self contained story on a topological approach to the robustness of feedback stabilization, carried out in a general framework including finite and infinite dimensional linear time invariant systems as well as continuous time and discrete time and even two dimensional systems, is presented. The operators induced by systems are proved to be closed and this property is used to apply the gap topology and the Lax theorem. The relationship between Bezout fractions and stabilizing controllers is discussed and the existence, in general, of a right (or left) Bezout fraction is shown, to ensure the existence of some stabilizing controllers. A mathematical formulation for robustness of feedback stabilization is given. A qualitative description of the robustness of feedback stabilization and a necessary and sufficient condition for robust stabilization characterized in terms of the gap topology are given. A quantitative description of robust stabilization for systems in the general framework is given. A special case of transfer matrices with entries in the quotient field of H infinity is examined. ESA

N92-12546# National Research Council of Canada, Ottawa (Ontario). Inst. for Information Technology.
SUPERVISORY AUTONOMY IN TELEROBOTICS
N. Burtnyk and J. Basran (Ottawa Univ., Ontario) Sep. 1990 7 p Presented at the Canadian Conference on Electrical and Computer Engineering, Ottawa, Ontario, 4-6 Sep. 1990
(NRC-31743; CTN-91-60225) Avail: NTIS HC/MF A02

Numerous examples of robots performing sensor based tasks can be found in the literature. For each of these, a model of the environment in which the task is being performed is provided. Applications that involve unstructured environments cannot easily take advantage of autonomous capability and are forced to rely mainly on teleoperation. A major challenge to current telerobotics development is to incorporate the robot's capability for autonomous operation wherever possible. This paper presents a supervisory control concept for exploiting autonomous functionality in an unstructured environment. Through an effective man-machine dialogue, the operator uses human perceptual and planning abilities to assist the robot in acquiring a model of the environment. Once this structure is acquired, the operator instructs the robot on how to perform a task as a sequence of actions based on generic skills. A discussion of the technical solutions that are essential to implement this concept and the results of development of a robot operating under supervised autonomy is presented.
Author (CISTI)

N92-12547# National Research Council of Canada, Ottawa (Ontario). Div. of Electrical Engineering.
A METHOD OF COMPUTING SMOOTH TRANSITIONS BETWEEN A SEQUENCE OF STRAIGHT LINE PATHS FOR AN AUTONOMOUS VEHICLE
R. Liscano and D. Green Jun. 1990 13 p
(NRC-31776; NRC-ERB-1031; CTN-91-60268) Copyright Avail: NTIS HC/MF A03

A trajectory generator for an autonomous vehicle is described that calculates the required platform velocities to achieve a smooth and predictable transition between two straight line paths of motion. The transition motion follows a continuous-curvature path consisting of a clothoid pair or clothoid arc pair of curves. The clothoid curves are a direct result of using a constant angular acceleration during the transition curve. A Taylor series expansion of a Fresnel integral is used to get a closed-form approximation for the clothoid curve. Whenever possible, the linear velocity of the vehicle throughout the transitional curve is the same as what it was during the straight line portion of the specified path. If a transition is not possible at the desired linear velocity then the maximum possible velocity that would allow a smooth transition is computed. Results have been demonstrated by implementing the equations to compute the transition curves on an autonomous vehicle. CISTI

N92-12548# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Operations Research, Statistics, and System Theory.
ANALYSIS AND OPTIMIZATION OF POLLING SYSTEMS
O. J. Boxma (Tilburg Univ., Netherlands) Jan. 1991 17 p
Presented at the 13th International Teletraffic Congress/Workshop on Stochastic Modeling, Copenhagen, Denmark, Jun. 1991 Submitted for publication Sponsored by Netherlands Organization for the Advancement of Research
(CWI-BS-R9102; ETN-91-90214) Copyright Avail: NTIS HC/MF A03

The basic polling system is a system of multiple queues, attended to by a single server in a cyclic order. Polling systems arise naturally in the modeling of many communication, computer, and production networks where several users compete for access to a common resource. Such applications also give rise to several variants of the basic polling system, like periodic polling; here the server visit the queues in a fixed order specified by a polling table in which each queue occurs at least once. The theory of polling systems is going through a period of feverish activity. The aim of this paper is to simulate the discussion on what are the really important problems; both from a theoretical and an applied point of view. It is argued that optimization of polling systems is one of those problems. The analysis of a polling optimization problem, the determination of that polling table in a periodic polling model that minimizes a certain weighted sum of the mean waiting times, is considered. ESA

N92-12549*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
DIAGNOSTIC REASONING TECHNIQUES FOR SELECTIVE MONITORING
L. S. Homem-de-Mello and R. J. Doyle 1 Mar. 1991 30 p
(Contract NAS7-918)
(NASA-CR-189446; JPL-Publ-91-6; NAS 1.26:189446) Avail: NTIS HC/MF A03 CSCL 09B

An architecture for using diagnostic reasoning techniques in selective monitoring is presented. Given the sensor readings and a model of the physical system, a number of assertions are generated and expressed as Boolean equations. The resulting system of Boolean equations is solved symbolically. Using a priori probabilities of component failure and Bayes' rule, revised probabilities of failure can be computed. These will indicate what components have failed or are the most likely to have failed. This approach is suitable for systems that are well understood and for which the correctness of the assertions can be guaranteed. Also, the system must be such that changes are slow enough to allow the computation. Author

N92-12550 Politecnico di Milano (Italy). Dipt. di Elettronica.
MACHINE LEARNING: AN APPROACH BASED ON CLASSIFIER SYSTEMS AND EVOLUTIONARY ALGORITHMS
Marco Dorigo Oct. 1990 16 p
(Rept-90-043; ETN-91-90242) Avail: Politecnico di Milano, Piazza Leonardo da Vinci 32, 20133 Milan, Italy

Machine Learning (ML) is a field in which all of the most challenging aspects of AI (Artificial Intelligence) research can be found. It is also sometimes claimed that ML research represents the quintessence of research in AI. After all at least the so called strong AI people have as ultimate goal the design of intelligence machines, and an intelligent being that cannot learn cannot be conceived. An overview of this field, lately grown to a large one, is reviewed and attention is focused on the model known as Genetic Based Machine Learning (GBML). The model is presented and an extensive overview of its strength and weakness is given. The removal of some of the GBML weakness by means of a different approach to the apportionment of credit problem (the problem to decide which of the rules governing the system are useful and which are not) is addressed and directions for further research are indicated. ESA

N92-12551 Politecnico di Milano (Italy). Dipt. di Elettronica.
CONSTRAINED RECEDING-HORIZON PREDICTIVE CONTROL
D. W. Clarke (Oxford Univ., England) and R. Scattolini 1990 29 p Sponsored in part by Science Research Council and MURST
(Grant NATO-0312/88)
(Rept-90-062; ETN-91-90245) Avail: Politecnico di Milano, Piazza Leonardo da Vinci 32, 20133 Milan, Italy

Constrained Receding Horizon Predictive Control (CRHPC) is intended for demanding control applications where conventional predictive control designs can fail. The idea behind CRHPC is to optimize a quadratic function over a costing horizon subject to the conditions that the output matches the reference value over a further constraint range. Theorems show that the method stabilizes general linear plants (e.g., unstable, nonminimum phase, dead time). Simulation studies demonstrate good behavior with even nearly unobservable systems (where GPC is ineffective) and that control costing is a particularly effective tuning parameter. ESA

N92-12552 Politecnico di Milano (Italy). Dipt. di Elettronica.
A BOOTSTRAPPING APPROACH TO ROBOT INTELLIGENCE: FIRST RESULTS
Marco Dorigo and Uwe Schnepf (Gesellschaft fuer Mathematik und Datenverarbeitung, Saint Augustin, Germany, F.R.) Dec. 1990 21 p Sponsored by CNR
(Rept-90-068; ETN-91-90248) Avail: Politecnico di Milano, Piazza Leonardo da Vinci 32, 20133 Milan, Italy

Results of the combination of genetic based machine learning and behavior based robotics, used to develop an approach to intelligent systems design are described. The traditional top down approach of artificial intelligence does not provide either the robustness or the flexibility necessary to develop systems an observer would describe as intelligent. The alternative, behavior based approach focuses on the development of flexible robot behavior in order to build intelligent systems bottom up. A major issue in the latter approach is the expected increasing complexity of the robot interaction with the real world hence enabling the robot to develop intelligent skills and true intelligence later on. Work done in this field is believed to so far neglect the need of learning capabilities, and an approach to behavior based robotics is presented. The ethologically inspired system architecture is presented and first experiments and results discussed. ESA

N92-12553 Politecnico di Milano (Italy). Dipt. di Elettronica.
NEW PERSPECTIVES ABOUT DEFAULT HIERARCHIES FORMATION IN LEARNING CLASSIFIER SYSTEMS
Marco Dorigo Jan. 1991 13 p Sponsored in part by CNR
(Rept-91-002; ETN-91-90250) Avail: Politecnico di Milano, Piazza Leonardo da Vinci 32, 20133 Milan, Italy

The results of research in default hierarchies formation are presented. A default hierarchy is a set of rules that models a set

of environmental states. In a default hierarchy some default rules cover most of the environmental states while specific ones cover exceptions. It is well known that default hierarchies can be used to categorize environmental states very efficiently. In fact, a default hierarchy implements a quasi homomorphic model of the world, which usually requires far less rule than a homomorphic one. Learning Classifier Systems (LCS) are introduced. A result widely used to analyze the way default hierarchies behave under the bucket brigade algorithm is analyzed and why it is not correct is shown. A different and more precise analysis is presented along with simulation results. A different approach to the apportionment of credit problem and an algorithm which inherently creates, when possible, default hierarchies are presented. Simulation results are reported to sustain the theoretical approach. ESA

N92-12554# Loughborough Univ. of Technology (England). Dept. of Mathematical Sciences.
GENERAL POLE STRUCTURE ASSIGNMENT IN SINGULAR SYSTEMS
A. C. Pugh, E. R. Ll. Jones, and G. E. Hayton (Hull Univ., England) Jun. 1991 9 p
(MATHS-Rept-A-147; ETN-91-90290) Avail: NTIS HC/MF A02

Necessary conditions for the general problem of pole assignment by output feedback are shown to relate to the problem concerning singular systems and generalized state feedback, and a further necessary condition is derived. In a certain case these conditions are sufficient. ESA

64 NUMERICAL ANALYSIS

Includes iteration, difference equations, and numerical approximation.

N92-12555# Stanford Linear Accelerator Center, CA.
BIT-STRING SCATTERING THEORY
H. P. Noyes 29 Jan. 1990 26 p Presented at the 11th Annual International Meeting of the Alternative Natural Philosophy Association, Cambridge, England, 14-17 Sep. 1989
(Contract DE-AC03-76SF-00515)
(DE90-008013; SU-SLAC-PUB-5085; CONF-8909297-2) Avail: NTIS HC/MF A03

We construct discrete space-time coordinates separated by the Lorentz-invariant intervals h/mc in space and h/mc(exp 2) in time using discrimination (XOR) between pairs of independently generated bit-strings; we prove that if this space is homogeneous and isotropic, it can have only 1, 2, or 3 spacial dimensions once we have related time to a global ordering operator. On this space, we construct exact combinatorial expressions for free particle wave functions taking proper account of the interference between indistinguishable alternative paths created by the construction. Because the end-points of the paths are fixed, they specify completed processes; our wave functions are born collapsed. A convenient way to represent this model is in terms of complex amplitudes whose squares give the probability for a particular set of observable processes to be completed. For distances much greater than h/mc and times much greater than h/mc(exp 2) our wave functions can be approximated by solutions of the free particle Dirac and Klein-Gordon equations. Using a eight-counter paradigm we relate this construction to scattering experiments involving four distinguishable particles, and indicate how this can be used to calculate electromagnetic and weak scattering processes. We derive a non-perturbative formula relating relativistic bound and resonant state energies to mass ratios and coupling constants, equivalent to our earlier derivation of the Bohr relativistic formula for hydrogen. Using the Fermi-Yang model of the pion as a relativistic bound state containing a nucleon-antinucleon pair, we find that (G(sub pi N)(exp 2))(exp 2) = (2m(sub N)/m(sub pi))(exp 2) - 1. DOE

N92-12556*# Institute for Computer Applications in Science and Engineering, Hampton, VA.
THE STABILITY OF NUMERICAL BOUNDARY TREATMENTS FOR COMPACT HIGH-ORDER FINITE-DIFFERENCE SCHEMES Final Report
Mark H. Carpenter, David Gottlieb, and Saul Abarbanel (Tel-Aviv Univ., Israel) Sep. 1991 58 p Submitted for publication
(Contract NAS1-18605)
(NASA-CR-187628; NAS 1.26:187628; ICASE-91-71) Avail: NTIS HC/MF A04 CSCL 12A

The stability characteristics of various compact fourth and sixth order spatial operators are assessed using the theory of Gustafsson, Kreiss and Sundstrom (G-K-S) for the semi-discrete Initial Boundary Value Problem (IBVP). These results are then generalized to the fully discrete case using a recently developed theory of Kreiss. In all cases, favorable comparisons are obtained between the G-K-S theory, eigenvalue determination, and numerical simulation. The conventional definition of stability is then sharpened to include only those spatial discretizations that are asymptotically stable. It is shown that many of the higher order schemes which are G-K-S stable are not asymptotically stable. A series of compact fourth and sixth order schemes, which are both asymptotically and G-K-S stable for the scalar case, are then developed. Author

N92-12557*# Institute for Computer Applications in Science and Engineering, Hampton, VA.
ENERGY MODELS FOR ONE-CARRIER TRANSPORT IN SEMICONDUCTOR DEVICES Final Report
Joseph W. Jerome and Chi-Wang Shu (Brown Univ., Providence, RI.) Oct. 1991 29 p Submitted for publication
(Contracts NAS1-18605; NAG1-1145; NSF DMS-89-22398; DAAL03-91-G-0123)
(NASA-CR-189046; NAS 1.26:189046; ICASE-91-78) Avail: NTIS HC/MF A03 CSCL 12A

Moment models of carrier transport, derived from the Boltzmann equation, made possible the simulation of certain key effects through such realistic assumptions as energy dependent mobility functions. This type of global dependence permits the observation of velocity overshoot in the vicinity of device junctions, not discerned via classical drift-diffusion models, which are primarily local in nature. It was found that a critical role is played in the hydrodynamic model by the heat conduction term. When ignored, the overshoot is inappropriately damped. When the standard choice of the Wiedemann-Franz law is made for the conductivity, spurious overshoot is observed. Agreement with Monte-Carlo simulation in this regime required empirical modification of this law, or nonstandard choices. Simulations of the hydrodynamic model in one and two dimensions, as well as simulations of a newly developed energy model, the RT model, are presented. The RT model, intermediate between the hydrodynamic and drift-diffusion model, was developed to eliminate the parabolic energy band and Maxwellian distribution assumptions, and to reduce the spurious overshoot with physically consistent assumptions. The algorithms employed for both models are the essentially non-oscillatory shock capturing algorithms. Some mathematical results are presented and contrasted with the highly developed state of the drift-diffusion model. Author

N92-12558# Colorado School of Mines, Golden. Center for Wave Phenomena.
THREE-DIMENSIONAL EXPLICIT DEPTH MIGRATION VIA MCCLELLAN TRANSFORMATIONS ON HEXAGONAL SAMPLING GRIDS Ph.D. Thesis
J. P. Hedley Jun. 1991 36 p
(Contract DE-FG02-89ER-14079)
(DE91-017370; DOE/ER-14079/10; CWP-110) Avail: NTIS HC/MF A03

The computational cost of three-dimensional depth migration depends almost entirely on the cost of depth extrapolation. Each frequency of a 3-D seismic wavefield can be extrapolated by two-dimensional filters that vary spatially according to frequency and velocity. 2-D extrapolation filters are efficiently designed and

implemented by use of McClellan transformations. McClellan transformations convert 1-D extrapolation filters to approximately circularly symmetric 2-D extrapolation filters at computational cost that is proportional to the number of unique coefficients, N, in the 1-D extrapolation filters. In contrast, the cost of direct convolution of 2-D extrapolation filters is proportional to N(exp 2). Imaging of steep digs requires long extrapolation filters, i.e., large N, making direct 2-D convolution very expensive. Although efficient, McClellan transformations only approximate circularly symmetric 2-D filters for depth extrapolation. The accuracy of a 2-D extrapolation filter can be improved only at an increase in the cost of implementing that filter. By applying McClellan transformations on a hexagonal sampling grid, the accuracy of 2-D extrapolation filters can be improved at a reduction in cost. Furthermore, hexagonal sampling grids are the most efficient for spatially circularly band-limited seismic data, reducing the number of samples that are repeatedly processed during recursive, depth extrapolation. DOE

N92-12559# National Research Council of Canada, Ottawa (Ontario). Div. of Electrical Engineering.
ALGEBRAIC ERROR ANALYSIS FOR SURFACE CURVATURES OF 3-D RANGE IMAGES
Nabih N. Abdelmalek and Pierre Boulanger 1989 8 p Presented at the Vision Interface '89, London, Ontario, 19-23 Jun. 1989
(NRC-30297; CTN-91-60226) Avail: NTIS HC/MF A02

Surface curvatures of 3-D range images are invariant under translation and space rotation. They are powerful tools in image description and segmentation. Normally the range data is contaminated with noise and the calculated surface curvatures for 3-D range images are very sensitive to noise. As a result, when the surface is segmented using the curvature sign labels, spurious patches are created in the segmentation. The method of calculating the Gaussian and mean curvatures of 3-D range images using differential geometry and approximation theory is given. An algebraic error analysis for the calculated curvatures is then presented. Upper bounds for the curvature error terms are obtained as a function of the window size used in the curvature calculation and of the noise standard deviation. The error analysis results are used to illustrate the effect of noise on the segmentation results using curvature sign labels. A segmentation procedure for 3-D range images using a 3-sign label scheme is proposed. Experimental results are presented. Author (CISTI)

N92-12560# Technische Univ., Berlin (Germany, F.R.). Fachbereich Mathematik.
CONVEXLY CONSTRAINED ILL POSED PROBLEMS AND THEIR REGULARIZATION, USING ITERATIVE PROCESSES Ph.D. Thesis [KONVEX-RESTRINGIERTE SCHLECHTGESTELLTE PROBLEME UND IHRE REGULARISIERUNG DURCH ITERATIONSVERFAHREN]
Bertolt Eicke 1991 86 p In GERMAN
(ETN-91-90156) Avail: NTIS HC/MF A05

Minimization problems are considered in Hilbert space. The properties of the solution operator are analyzed. The fundamental question is the well posedness of the problem. A direct generalization of the theory of linear ill posed problems is existent in Hilbert space. When a problem is ill posed and the data are incorrect, the solution by the regularizing process ensues. Aside from the Tikhonov process, the solution by the iterative method is to be taken into account. It is shown that gradient projection processes and their variants play a predominant part. The regularizing effect of these processes, e.g., convergence for exact data, convergence order and additional information, stability by faulty data, is examined in detail. ESA

N92-12561# Technische Univ., Berlin (Germany, F.R.). Fachbereich Mathematik.
A PROCESS FOR THE CALCULATION BY APPROXIMATION OF THE PREISACH OPERATOR WITH USUAL DIFFERENTIAL EQUATION APPLICATIONS Ph.D. Thesis [EIN VERFAHREN ZUR NAEHERUNGSWEISEN BERECHNUNG DES PREISACHOPERATORS MIT ANWENDUNGEN BEI GEWOEHNLICHEN DIFFERENTIALGLEICHUNGEN]
Thomas Huetter 1991 152 p In GERMAN
(ETN-91-90157) Avail: NTIS HC/MF A08

A new presentation of the Preisach operator and derived numerical applications are described. The Preisach operator is introduced, using the new concepts of Preisach quantities and Preisach cycle operators. Examples are given. An approximation of the Preisach operator is carried out using special density functions. Computation instructions are reported. The present knowledge is adapted to theory, in order to solve usual differential equations, by which problems of theoretical nature and numerical approaches and assessments are discussed. ESA

N92-12562# Technische Hochschule, Darmstadt (Germany, F.R.). Fachbereich Physik.
THE THEORY OF VARIATIONAL INEQUALITIES AND ITS APPLICATION TO CONTACT PROBLEMS WITH FRICTION Ph.D. Thesis [ZUR THEORIE DER VARIATIONSUNGLEICHUNGEN UND DEREN ANWENDUNG AUF REIBUNGSBEHAFTETE KONTAKPROBLEME]
Wolfgang Roemer 1989 132 p In GERMAN
(ETN-91-90183) Avail: NTIS HC/MF A07

The main developments within the theory of variational inequalities are reviewed. Variational inequalities in topological vector spaces and variational inequalities of monotone type in normalized vector spaces were examined. The contact problem was considered. The existence and unambiguousness of weak solutions are reported. The regularity of weak solutions are reported. A weak formulation of a contact problem with simplified friction law is discussed. ESA

N92-12563# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Operations Research, Statistics, and System Theory.
DESCRIPTOR REPRESENTATIONS WITHOUT DIRECT FEEDTHROUGH TERM
M. Kuijper Jan. 1991 20 p Submitted for publication Sponsored by Netherlands Organization for the Advancement of Research
(CWI-BS-R9103; ETN-91-90215) Copyright Avail: NTIS HC/MF A03

Descriptor representations are considered that are given by (E,A,B,C,D) with D equal to 0. Minimality under external equivalence is characterized in terms of the matrices E,A,B and C. Also, transformations are given by which minimal (E,A,B,C) representations are related under external equivalence. The results are compared with similar results for representations with D not equal to 0; the transformations turn out to be more simple in the D equals 0 case. A realization procedure is given for obtaining a minimal (E,A,B,C) representation for a system that is given by autoregressive equations. ESA

N92-12564# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Analysis, Algebra and Geometry.
CENTRAL LIMIT THEOREM FOR NON-HOMOGENEOUS PROCESSES WITH INDEPENDENT INCREMENTS AND SEMIMARKOV SWITCHINGS
V. V. Koroliuk (Kiev Univ., USSR) Dec. 1990 7 p Sponsored by Netherlands Organization for the Advancement of Research
(CWI-AM-R9026; ETN-91-90225) Copyright Avail: NTIS HC/MF A02

The problem of the applicability of the central limit theorem for nonhomogeneous processes with independent increments and semimarkov switchover is considered. For construction of the centered deviations process, which satisfies with the central limit theorem, the problem of choice of the compensating averaged drift is solved. ESA

N92-12565# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Numerical Mathematics.
SMOOTHED RUNGE-KUTTA METHODS IN THE METHOD OF LINES

P. J. vanderHouwen, B. P. Sommeijer, and K. Strehmel (Martin Luther-Univ., Halle-Wittenberg, German D.R.) Jan. 1991 17 p Sponsored by Netherlands Organization for the Advancement of Research
(CWI-NM-R9101; ETN-91-90226) Copyright Avail: NTIS HC/MF A03

The effect of introducing smoothing matrices into Runge-Kutta methods for solving semidiscrete partial differential equations is investigated. Stability and accuracy are focussed upon. It is shown that the stiffness of the initial value problem can be removed by inserting simply structured smoothing matrices that are designed for use on vector computers so that the increase of the computational costs is rather modest. A number of explicitly given methods together with their smoothing error and stability boundaries are given. Numerical examples illustrate the theoretical results. ESA

N92-12566# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Numerical Mathematics.
A TWO-GRID ANALYSIS OF THE COMBINATION OF MIXED FINITE ELEMENTS AND VANKA-TYPE RELAXATION
J. Molenaar Jan. 1991 16 p Sponsored by Netherlands Organization for the Advancement of Research
(CWI-NM-R9102; ETN-91-90227) Copyright Avail: NTIS HC/MF A03

A two grid algorithm is discussed for the mixed finite element discretization of Poisson's equation. The algorithm is based on a Vanka type relaxation; the grid transfer operators are selected in accordance with the discretization. Local mode analysis is used to show that Vanka type relaxation is an efficient smoother indeed. By studying the Fourier transform of the error amplification matrix, the canonical grid transfer operators are found to be sufficiently accurate for grid independent convergence. However, this conclusion depends on the relaxation operator used. ESA

N92-12567# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Numerical Mathematics.
PARALLEL DIAGONALLY IMPLICIT RUNGE-KUTTA-NYSTROEM METHODS
P. J. vanderHouwen, B. P. Sommeijer, and Nguyen Huu Cong (Hanoi Univ., Vietnam) Jan. 1991 17 p Sponsored by Amsterdam Univ. and Netherlands Organization for the Advancement of Research
(CWI-NM-R9103; ETN-91-90228) Copyright Avail: NTIS HC/MF A03

Diagonally implicit iteration methods for solving implicit Runge-Kutta-Nystroem methods on parallel computers are studied. These iteration methods are such that in each step, the iterated method belongs to the class of Diagonally Implicit Runge-Kutta-Nystroem methods (DIRKN). The number of stages of this DIRKN method depends on the number of iterations and may vary from step to step. Since a large number of these stages can be computed in parallel, and since the total number of stages can be kept small by a suitable choice of the parameters in the iteration process, the resulting variable stage DIRKN methods are rather efficient on parallel computers. By using implicit Runge-Kutta-Nystroem methods with high stage order, the phenomenon of order reduction exhibited in many problems with large Lipschitz constants does not deteriorate the accuracy of these variable stage DIRKN methods. ESA

N92-12568# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Numerical Mathematics.
PARALLEL SOLUTION OF THE BURGERS EQUATION
P. J. vanderHouwen and B. P. Sommeijer Feb. 1991 18 p Sponsored by Netherlands Organization for the Advancement of Research
(CWI-NM-R9104; ETN-91-90229) Copyright Avail: NTIS HC/MF A03

When applying the method of lines to partial differential equations and using explicit methods for the time integration, the time step is usually severely restricted by stability conditions. The Burgers equation is focussed upon and an attempt is made to relax the time step conditions by applying fractional step (or operator splitting methods) based on Runge-Kutta methods. Parallel versions with increased order of accuracy are also considered. ESA

N92-12569# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Numerical Mathematics.
LOCAL UNIFORM GRID REFINEMENT FOR TIME-DEPENDENT PARTIAL DIFFERENTIAL EQUATIONS
J. G. Verwer and R. A. Trompert Feb. 1991 21 p Presented at the 14th Biennial Conference on Numerical Analysis, Dundee, Scotland, 25-28 Jun. 1991 Submitted for publication Sponsored by Netherlands Organization for the Advancement of Research
(CWI-NM-R9105; ETN-91-90230) Copyright Avail: NTIS HC/MF A03

The LUGR (Local Uniform Grid Refinement) technique is examined for time dependent problems when combined with static regridding. Static regridding means that in the course of the time evolution the space grid is adapted only at discrete values of time. A local refinement theory underlying the criterion that the multilevel LUGR scheme maintains the spatial accuracy of the finest grid in use when applied in the single fixed grid mode is presented. This way automatic control on the inevitable accumulation of interpolation errors for evolving time is provided. Following the method of lines approach, this theory is first developed for the implicit Euler LUGR method applied to a general nonlinear partial differential equation problem. It is shown how results can be extended to general Runge-Kutta and linear multistep LUGR methods. The local refinement theory is numerically illustrated for two parabolic model problems. ESA

N92-12570# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Numerical Mathematics.
EFFICIENT MULTI-DIMENSIONAL UPWINDING FOR THE STEADY EULER EQUATIONS
P. W. Hemker and B. Koren Mar. 1991 38 p Sponsored by ESA and Netherlands Organization for the Advancement of Research
(CWI-NM-R9107; ETN-91-90232) Copyright Avail: NTIS HC/MF A03

Multidimensional upwind discretizations for the steady Euler equations are studied with the emphasis on both accuracy and efficiency. The multidimensional upwind methods consist of a one dimensional Riemann solver with a locally rotated left and right cell face state with the rotation angle depending on the local flow solution. On the basis of a model equation, a study of the accuracy and stability properties of some of these multidimensional upwind schemes is made. For the steady, two dimensional Euler equations, numerical results are presented for some supersonic test cases with an oblique contact discontinuity and for some supersonic test cases with an oblique shock wave. The numerical results are in good agreement with the theoretical predictions. Comparisons are made with results obtained by standard one dimensional upwind schemes. The obtained multidimensional results compare very well, both with respect to accuracy and efficiency. ESA

N92-12571 Politecnico di Milano (Italy). Dipt. di Elettronica.
COMMENTS ON: STABILIZABILITY AND DETECTABILITY OF DISCRETE-TIME TIME-VARYING SYSTEMS
Sergio Bittanti, Paolo Bolzern, and Giuseppe DeNicolao (Consiglio Nazionale delle Ricerche, Milan, Italy) 1990 4 p Sponsored by MURST and CNR
(Rept-90-014; ETN-91-90235) Avail: Politecnico di Milano, Piazza Leonardo da Vinci 32, 20133 Milan, Italy

In the title document, discrete time and time varying systems are analyzed by resorting to systems that have time varying order. Some comments are made on this issue. A counterexample was presented in the title document which was claimed to contradict the result of a second document on the subject. Such a counterexample is shown not to actually entail any contradiction with the second document. ESA

N92-12572 Politecnico di Milano (Italy). Dipt. di Elettronica.
DIFFERENCE AND DIFFERENTIAL RICCATI EQUATIONS: A NOTE ON THE CONVERGENCE TO THE STRONG SOLUTION
Giuseppe DeNicolao (Consiglio Nazionale delle Ricerche, Milan, Italy) 1990 8 p Sponsored by MURST and CNR
(Rept-90-015; ETN-91-90236) Avail: Politecnico di Milano, Piazza Leonardo da Vinci 32, 20133 Milan, Italy

The convergence of the solutions of the differential and difference Riccati equations to the strong solution of the corresponding Algebraic Riccati Equation is addressed. Only detectability is required in the analysis and no assumption is made on the eigenvalues on the real imaginery axis (on the unit circle, in the discrete time case). In particular, from the result, it follows that, under the sole assumption of detectability, a positive definite inital condition guarantees convergence to the strong solution, even in presence of unreachable eigenvalues on the imaginery axis or on the unit circle. ESA

N92-12573 Politecnico di Milano (Italy). Dipt. di Elettronica.
A MINIMUM PREDICTION ERROR ALGORITHM FOR ESTIMATION OF PERIODIC ARMA MODELS
Sergio Bittanti, Paolo Bolzern, Giuseppe DeNicolao (Consiglio Nazionale delle Ricerche, Milan, Italy), L. Piroddi, and D. Purassanta 1990 13 p Sponsored by MURST and CNR
(Rept-90-016; ETN-91-90237) Avail: Politecnico di Milano, Piazza Leonardo da Vinci 32, 20133 Milan, Italy

Parameter estimation of Periodic Auto Regressive Moving Average (PARMA) models is considered. An iterative algorithm that minimizes the mean square of the one step ahead prediction errors is proposed. At each iteration the data are to be filtered by means of suitable periodic recursions. To guarantee the stability of such filters, the periodic zeros of the currently estimated PARMA model must lie inside the unit circle. Whenever such a condition is not met, the stability is recovered by suitably projecting the nonminimim phase model into a minimum phase one. This is accomplished by resorting to a newly developed technique for the solution of the periodic canonical factorization problem. The applicability of the technique is shown through the analysis of some sets of simulated data. ESA

N92-12574 Politecnico di Milano (Italy). Dipt. di Elettronica.
DIFFERENTIAL PERIODIC RICCATI EQUATIONS: A NOTE ON THE EXISTENCE OF AN INFINITE NUMBER OF PERIODIC STRONG SOLUTIONS
Giuseppe DeNicolao (Consiglio Nazionale delle Ricerche, Milan, Italy) 1990 9 p Sponsored by MURST and CNR
(Rept-90-020; ETN-91-90239) Avail: Politecnico di Milano, Piazza Leonardo da Vinci 32, 20133 Milan, Italy

The differential matrix Riccati equation with periodic coefficients is considered. By means of a counterexample, a sufficient condition for the existence of an infinite number of periodic nonnegative definite solutions given by Kano and Nishimura is shown to be incorrect. By suitably modifying the assumption, new sufficient conditions are established. Thanks to these results, a necessary and sufficient condition for the existence of the periodic strong solution, which relied on the incorrect condition, can be shown to be still valid. ESA

N92-12575 Politecnico di Milano (Italy). Dipt. di Elettronica.
ON THE CONVERGENCE TO THE STRONG SOLUTION OF PERIODIC RICCATI EQUATIONS
Giuseppe DeNicolao (Consiglio Nazionale delle Ricerche, Milan, Italy) 1990 14 p Sponsored by MURST and CNR
(Rept-90-021; ETN-91-90240) Avail: Politecnico di Milano, Piazza Leonardo da Vinci 32, 20133 Milan, Italy

The convergence of the solution of the differential and difference periodic Riccati equation with nonnegative initial conditions is studied. In particular, with reference to the Riccati equations of optimal filtering, detectable but not necessarily stabilizable systems are considered and no restrictive assumption is imposed on the modulus of the unreachable characteristic multipliers. A new condition for the convergence to the periodic strong solution is provided. As a corollary, it follows that, for any positive definite initial condition, the solution of the periodic Riccati equation converges to the periodic strong solution. ESA

N92-12576# Norwegian Defence Research Establishment, Kjeller.
THE ODE FORMULATION OF HYPERBOLIC PDE'S DISCRETIZED BY THE SPECTRAL COLLOCATION METHOD
Morten Bjoerhus 4 Apr. 1991 22 p
(FFI-91/7011; ISSN-0802-2437; ETN-91-90260) Avail: NTIS HC/MF A03

Hyperbolic Partial Differential Equations (PDE's) with characteristic boundary conditions are formulated as pure Ordinary Differential Equation (ODE) initial value problems. In particular, this enables a straightforward application of implicit methods for the time integration. The theory is tested on the one dimensional Euler equations with open boundaries, using both explicit and implicit second order Runge-Kutta methods. The manner in which the open boundaries is handled seems promising. ESA

N92-12577# Loughborough Univ. of Technology (England). Dept. of Mathematical Sciences.
MOTIVATING QUASI-NEWTON UPDATES BY PRECONDITIONED CONJUGATE GRADIENT METHODS
Y. F. Hu and C. Storey Jul. 1991 25 p Presented at 14th International Symposioum on Mathematical Programming, Amsterdam, Netherlands, 5-9 Aug. 1991
(MATHS-Rept-A-150; ETN-91-90292) Avail: NTIS HC/MF A03

It is shown how the self scaling Broyden family of updates can be interpreted as a preconditioned version of a conjugate gradient method that takes inexact line searches into account. Using the approach to quasi-Newton methods, an extended BFGS algorithm is derived. The algorithm is compared with BFGS over a wide range of test functions and starting points and an implementation of the algorithm is found to be slightly superior to BFGS indicating the usefulness of the new interpretation of quasi-Newton methods. ESA

N92-12578# Lawrence Livermore National Lab., CA.
ALGEBRAIC CALCULATION OF STROBOSCOPIC MAPS OF ORDINARY, NONLINEAR DIFFERENTIAL EQUATIONS
R. Wackerbauer, A. Huebler (Illinois Univ., Urbana.), and G. Mayer-Kress 25 Jul. 1991 70 p Presented at the Experimental Mathematics: Computational Issues in Nonlinear Science, Los Alamos, NM, 20-24 May 1991
(Contract W-7405-eng-36)
(DE92-000220; LA-UR-91-2965; CONF-9105242-2) Avail: NTIS HC/MF A04

The relation between the parameters of a differential equation and corresponding discrete maps are becoming increasingly important in the study of nonlinear dynamical systems. Maps are well adopted for numerical computation and several universal properties of them are known. Therefore some perturbation methods have been proposed to deduce them for physical systems, which can be modeled by an ordinary differential equation (ODE) with a small nonlinearity. A new iterative, rigorous algebraic method for the calculation of the coefficients of a Taylor expansion of a stroboscopic map from ODE's with not necessarily small nonlinearities is presented. It is shown analytically that most of the coefficients are small for a small integration time and grow slowly in the course of time if the flow vector field of the ODE is polynomial and if the ODE has fixed point in the origin. Approximations of different orders respectively of the rest term are investigated for several nonlinear systems. DOE

N92-12579# Oak Ridge National Lab., TN.
ON FINDING MINIMUM-DIAMETER CLIQUE TREES
J. R. S. Blair and B. W. Peyton Aug. 1991 40 p
(Contract DE-AC05-84OR-21400)
(DE92-000386; ORNL/TM-11850) Avail: NTIS HC/MF A03

It is well-known that any chordal graph can be represented as a clique tree (acyclic hypergraph, join tree). Since some chordal graphs have many distinct clique tree representations, it is

interesting to consider which one is most desirable under various circumstances. A clique tree of minimum diameter (or height) is sometimes a natural candidate when choosing clique trees to be processed in a parallel computing environment. This paper introduces a linear time algorithm for computing a minimum-diameter clique tree. The new algorithm is an analogue of the natural greedy algorithm for rooting an ordinary tree in order to minimize its height. It has potential application in the development of parallel algorithms for both knowledge-based systems and the solution of sparse linear systems of equations. DOE

N92-12580# Oak Ridge National Lab., TN.
A MONTE CARLO STUDY OF THE LIGHT (q SUP 2)(BAR q SUP 2) SYSTEM
G. Grondin 1991 7 p Presented at the 4th International Conference on Hadron Spectroscopy, College Park, MD, 12-16 Aug. 1991
(Contracts DE-AC05-84OR-21400; DE-AS05-76ER-03956)
(DE92-000449; ORNL/CCIP-91/25; UTK-91/09; UTPT-91/23; CONF-910864-1) Avail: NTIS HC/MF A02

We present results from a Guided Random Walk Monte Carlo simulation of the light (q = u, d) (q sup 2)(bar q sup 2) system in a Coulomb-plus-linear quark potential model using an Intel iPSC/860 hypercube. We find evidence for no bound states below the vector-vector threshold in the (J,I) = (2,2) and (2,0) sector. DOE

65 STATISTICS AND PROBABILITY

Includes data sampling and smoothing; Monte Carlo method; and stochastic processes.

N92-12581# Universitaet der Bundeswehr Muenchen, Neubiberg (Germany, F.R.). Forschungsschwerpunkt Simulation und Optimierung Deterministischer und Stochastischer Dynam. Syst.
SEMI-STOCHASTIC APPROXIMATION BY THE RESPONSE SURFACE METHODOLOGY (RSM)
K. Marti Jun. 1990 39 p
(ETN-91-90210) Avail: NTIS HC/MF A03

The approximate solution of a given stochastic optimization problem is considered. A further semistochastic approximation method based on the so called Response Surface Methodology (RSM) is used. Gradient estimation by RSM and estimation of the mean error are detailed. ESA

N92-12582# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Operations Research, Statistics, and System Theory.
A LOCAL LIMIT THEOREM FOR L-STATISTICS
R. Helmers Nov. 1990 13 p Sponsored by Netherlands Organization for the Advancement of Research
(CWI-BS-R9033; ETN-91-90211) Copyright Avail: NTIS HC/MF A03

A uniform local central limit theorem is established for the density of a linear combination of order statistics. Higher order approximations are also briefly considered. The Fourier inversion theorem is combined with suitable conditioning arguments. The main difficulty is to show that the characteristic function of a linear combination of order statistics is integrable. ESA

N92-12583# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Operations Research, Statistics, and System Theory.
TWO NONPARAMETRIC ESTIMATORS OF THE SURVIVAL FUNCTION OF BIVARIATE RIGHT CENSORED OBSERVATIONS
Dick M. Bakker Dec. 1990 47 p Sponsored by Netherlands Organization for the Advancement of Research
(CWI-BS-R9035; ETN-91-90212) Copyright Avail: NTIS HC/MF A03

A comparison is made of estimators for the bivariate survival function under random censoring. An estimator based on the product integral and one based on the Volterra integral equation is considered. Asymptotic root mean square errors are obtained through calculation of the influence curves of the estimators. The estimators are compared to a pathwise estimator. A large number of simulation results are given. ESA

N92-12584# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Operations Research, Statistics, and System Theory.
TAIT'S FLYPING CONJECTURE FOR WELL-CONNECTED LINKS
A. Schrijver (Amsterdam Univ., Netherlands) Dec. 1990 49 p Sponsored by Netherlands Organization for the Advancement of Research
(CWI-BS-R9037; ETN-91-90213) Copyright Avail: NTIS HC/MF A03

A link is considered well connected if its diagram has no 2 edge cut sets, and the only 4 edge cut sets are those made by a crossing. Tait's flyping conjecture for well connected links is proved, i.e., any two well connected alternating links are equivalent (ambient isotopic), if and only if their diagrams are the same (up to trivial operations). ESA

N92-12585# National Aerospace Lab., Amsterdam (Netherlands). Flight Div.
TIME-REVERSION OF A HYBRID STATE STOCHASTIC DIFFERENCE SYSTEM
H. A. P. Blom and Y. Bar-Shalom (Connecticut Univ., Storrs.) 16 Jan. 1989 11 p Presented at the 1989 IEEE International Conference on Control and Applications, Jerusalem, Israel, 3-6 Apr. 1989
(Grant AF-AFOSR-0112-84)
(NLT-TP-89014-U; ETN-91-99630) Avail: NTIS HC/MF A03

The reversion in time of a stochastic difference equation in a hybrid space, with a Markovian solution, is presented. The reversion is obtained by a martingale approach, which previoulsy led to reverse time forms for stochastic equations with Gauss-Markov or diffusion solutions. The reverse time equations follow from a particular noncanonical martingale decomposition, while the reverse time equations for Gauss-Markov and diffusion solutions followed from the canonical martingale decomposition. The need for this noncanonical decomposition stems from the hybrid state space situation. Moreover, the non Gaussian discrete time situation leads to reverse time equations that incorporate a Bayesian estimation step. ESA

N92-12586 Politecnico di Milano (Italy). Dipt. di Elettronica.
OPTIMAL STOCHASTIC CONTROL OF MULTIRATE SAMPLED-DATA SYSTEMS
P. Colaneri and Giuseppe DeNicolao (Consiglio Nazionale delle Ricerche, Milan, Italy) 1990 15 p Sponsored by MURST and CNR
(Rept-90-019; ETN-91-90238) Avail: Politecnico di Milano, Piazza Leonardo da Vinci 32, 20133 Milan, Italy

The multirate LQG (Linear Quadratic Gaussian) problem for stochastic continuous time systems is considered. A sufficient condition for the existence of an optimal stabilizing regulator is given in terms of the properties of the original system and cost function. This is accomplished by reducing the original problem to a discrete time periodic LQG problem. ESA

66 SYSTEMS ANALYSIS

Includes mathematical modeling; network analysis; and operations research.

N92-12587 Pittsburgh Univ., PA.
SYSTEM-BASED COMPONENT TEST PROBLEM: THE DESIGN OF OPTIMUM SYSTEM BASED COMPONENT TEST PLANS

Ph.D. Thesis
Ismail Kuban Altinel 1990 241 p
Avail: Univ. Microfilms Order No. DA9120465

Testing a complex system is not feasible in many cases. Thus it may be found advantageous to make inferences about system reliability by using the information obtained on component reliabilities through component tests. An acceptance procedure based on component tests that guarantee preassigned probabilities on types I and II errors for system reliability was previously studied in the literature for series systems, parallel systems, and serial connection of redundant subsystems. Herein, the question is considered of whether the optimum solutions are modified if a priori deterministic information on individual component failure rates is available. Results have shown that it is profitable to use the given information. Throughout, it is assumed that parts have exponential life time which results in a Poisson distribution for failure. An algorithm is developed to compute optimum test times for series systems, parallel systems, and serial connection of redundant subsystems. Recent results for the theory of semi-infinite programming are used in these algorithms. Some intermediate results are also presented for the situation when the system is a coherent binary structure. Dissert. Abstr.

N92-12588# Messerschmitt-Boelkow-Blohm G.m.b.H., Munich (Germany, F.R.). Berichtsstelle.
COLUMBUS FREE FLYER CENTER: TASKS AND MANPOWER PROFILES
Hans Juergen C. Koopmann (Erno Raumfahrttechnik G.m.b.H. Bremen, Germany, F.R.) 1991 9 p Presented at the 28th Space Congress, Cocoa Beach, FL, 23-26 Apr. 1991
(MBB-UO-0154-91-PUB; OTN-019398; ETN-91-90192) Avail: NTIS HC/MF A02

The role of element centers within the Columbus ground infrastructure is considered. They will provide system expertise for mission/increment planning, execution and assessment and they will give support to strategical, tactical and executional levels of operations. Center tasks and tasks execution approach are defined together with the implementation approach. Manpower requirements and profiles are given. ESA

N92-12589# Messerschmitt-Boelkow-Blohm G.m.b.H., Munich (Germany, F.R.). Berichtsstelle.
COLUMBUS FREE FLYING LABORATORY (MTFF) LOGISTICS, TRANSPORTATION, AND GROUND PROCESSING
Mike C. Attwood, Manfred Nordhoff, and Horst Goerlich (Erno Raumfahrttechnik G.m.b.H. Bremen, Germany, F.R.) 1991 15 p Presented at the 4th European Aerospace Conference, Paris, France, 13-16 May 1991
(MBB-UO-0155-91-PUB; OTN-019397; ETN-91-90193) Avail: NTIS HC/MF A03

The Columbus Free Flying Laboratory (MTFF) logistics, handling and transportation and ground processing are discussed. MTFF requires the implementation of an integration logistics support system in order to ensure the supportability of the MTFF throughout its operational life of 30 years. Handling and transportation of the MTFF to the launch Site in configuration as close as possible to the launch configuration presents a challenge to transportation methods and scenarios, and requires an innovative infrastructure. Ground processing and checkout activities at the launch site need to be organized and time lined in a way to have existing launch site facilities and capabilities support the MTFF needs, and to meet the scheduled launch date. ESA

N92-12590# Messerschmitt-Boelkow-Blohm G.m.b.H., Munich (Germany, F.R.). Helicopter Div.
REQUIREMENTS AND POSSIBLE TECHNICAL SOLUTIONS DERIVED FROM THE NEW AIRMOBILITY CONCEPT OF THE GERMAN ARMY
Rolf-D. vonReth and H. Koehler May 1991 18 p Presented at the 47th AHS Annual Forum, Phoenix, AZ, 6-8 May 1991
(MBB-UD-0596-91-PUB; ETN-91-90198) Avail: NTIS HC/MF A03

Significant changes in the political and strategic European scenario require new ideas with respect to concept, structure and equipment and as to how basically defensive forces are able to fulfil their tasks in the future. Early dialogue between industry and armed forces is intended to improve coordination between military aims and viable technical solutions looking at the new extension of the army battle into the third dimension. Based on representative scenarios a number of missions and tasks were derived, for which technical solutions are proposed. Applying various operation research simulation models, investigations were carried out and planned equipment changes considered. All facets of the German army airmobility concept were treated simultaneously and a harmonized set of recomendations is achieved. Major conclusions and recommendations are summarized. ESA

67 THEORETICAL MATHEMATICS

Includes topology and number theory.

N92-12591# Argonne National Lab., IL.
FROM KNOTS TO QUANTUM GROUPS (AND BACK)
L. Kauffman (Illinois Univ., Chicago.) Apr. 1990 25 p Presented at the Informal Spring Workshop on Quantum Groups, Argonne, 26 Apr. - 11 May 1990
(Contract W-31-109-eng-38)
(DE90-013688; ANL-HEP-CP-90-36; CONF-9004228-1) Avail: NTIS HC/MF A03

This paper traces how the Jones polynomial leads naturally to the notion of quantum group, and how quantum groups give rise to invariants of links via solutions to the Yang-Baxter equation. Section 5, is an original treatment of the construction of the universal R-matrix. All the other material has, or will appear elsewhere in similar form. DOE

N92-12592# Argonne National Lab., IL.
CONSISTENT MULTIPARAMETER QUANTISATION OF GL(n)
A. Sudbery (York Univ., England) Apr. 1990 10 p Presented at the Informal Spring Workshop on Quantum Groups, Argonne, 26 Apr. - 11 May 1990
(Contract W-31-109-eng-38)
(DE90-013689; ANL-HEP-CP-90-32; CONF-9004228-1) Avail: NTIS HC/MF A02

We describe a manifold of quantum group structures on the vector space of the universal enveloping algebra of GL(n) and on its dual, the space of polynomials in n(exp 2) variables. The dimension of the manifolds is (n(exp 2) - n + 2)/2. DOE

N92-12593# Institute for Advanced Study, Princeton, NJ.
LECTURES ON RCFT (RATIONAL CONFORMAL FIELD THEORY)
G. Moore and N. Seiberg (Rutgers Univ., Piscataway, NJ.) Sep. 1989 127 p
(Contracts DE-AC02-76ER-02220; DE-AC02-76ER-03075)
(DE90-013731; RU-89-32; YCTP-P-13-89) Avail: NTIS HC/MF A07

We review some recent results in two dimensional Rational Conformal Field Theory. We discuss these theories as a generalization of group theory. The relation to a three dimensional topological theory is explained and the particle example of Chern-Simons-Witten theory is analyzed in detail. This study leads to a natural conjecture regarding the classification of all RCFT's. DOE

N92-12594# Technische Hochschule, Darmstadt (Germany, F.R.). Fachbereich Physik.
CONCEPT LATTICES WITH ANTI-ENDOMORPHISM Ph.D. Thesis [BEGRIFFSVERBAENDE MIT ANTI-ENDOMORPHISMUS]
Sigrid Hoch 1989 53 p In GERMAN
(ETN-91-90182) Avail: NTIS HC/MF A04

Only concept lattices with an additional one place operation, e.g., an anti endomorphism, are examined. It is discussed how the anti endomorphisms of a concept lattice can be identified in a

context. Some classical algebraic questions relating to concept lattices with anti endormorphism in context are dealt with. The theory of congruences and tolerances is reported. Subdirect and tensor products of concept lattices with an endormorphism are examined. The already existing concepts from formal lattice analysis are transferred as naturally as possible to concept lattices with antiendomorphism. ESA

70 PHYSICS (GENERAL)

For precision time and time interval (PTTI) see *35 Instrumentation and Photography;* for geophysics, astrophysics or solar physics see *46 Geophysics, 90 Astrophysics,* or *92 Solar Physics.*

N92-12595# Nationaal Inst. voor Kernfysica en Hoge Energiefysica, Amsterdam (Netherlands).
OPTIMIZATION ON AmPS CHICANE MAGNETS
R. Hoekstra 5 Jul. 1991 10 p
(NIKHEF-K-AmPS/91-02; ETN-91-90302) Avail: NTIS HC/MF A02

During the design of the chicane part of the AmPS (Amsterdam Pulse Stretcher) extraction line, a choice for the construction of these magnets had to be made from many possibilities. Since a horizontal as well as a vertical displacement is needed, the number of dipole magnets is at least two. These could have identical length and different fields since bending has to be different, or otherwise identical fields and different length, or have no identical displacement at all. If horizontal and vertical displacement are handled separately then four magnets are needed. This situation has the only advantage that alignment might be easier but must be done for four magnets and is of course not economical. The two magnet option was chosen. The optimization of the chicane magnets, their optics and layouts, their viewers, and their alignment are considered. ESA

N92-12596# Brookhaven National Lab., Upton, NY.
A COMPUTER PROGRAM FOR THE 2-D MAGNETOSTATIC PROBLEM BASED ON INTEGRAL EQUATIONS FOR THE FIELD OF THE CONDUCTORS AND BOUNDARY ELEMENTS
G. H. Morgan 1991 4 p Presented at the 12th International Conference on Magnet Technology, Leningrad, USSR, 23-28 Jun. 1991
(Contract DE-AC02-76CH-00016)
(DE92-000130; BNL-45727; CONF-910662-2) Avail: NTIS HC/MF A01

The iterative design of the 2-dimensional cross section of a beam transport magnet having infinitely permeable iron boundaries requires a fast means of computing the field of the conductors. Solutions in the form of series expansions are used for rectangular iron boundaries, and programs based on the method of images are used to simulate circular iron boundaries. A single procedure or program for dealing with an arbitrary iron boundary would be useful. The present program has been tested with rectangular and circular iron boundaries and provision has been made for the use of other curves. It uses complex contour integral equations for the field of the constant-current density conductors and complex line integrals for the field of the piecewise-linear boundary elements. DOE

71 ACOUSTICS

Includes sound generation, transmission and attenuation. For noise pollution see *45 Environmental Pollution.*

N92-12597 Polytechnic Univ., Brooklyn, NY.
WAVES AND FIELDS IN STRUCTURAL ACOUSTICS: FLUID-LOADED ELASTIC CYLINDRICAL AND SPHERICAL SHELLS Ph.D. Thesis
Jin-Meng Ho 1991 216 p
Avail: Univ. Microfilms Order No. DA9117484

Radiation and scattering of sound waves in the presence of fluid loaded thin elastic cylindrical and spherical shells were studied. The pressure fields in the fluid media are formulated in terms of Green's functions, which are attacked by a spectral analysis and synthesis procedure. This involves decomposition of the overall problem into 1-D constituents by the method of separation of variables, and reassembling of the 1-D Green's functions via a spectral integration over contours surrounding singularities of the 1-D Green's functions in the complex planes of (spatial) spectral parameters (separation parameters). Alternative representations that favor different parameter ranges are then derived directly from the general spectral integral forms, with emphasis placed on ray acoustic reductions that give rise to fundamental wave processes, such as incident and specularly reflected waves as well as shell guided leaky, creeping, and trapped waves, on a physically observable base. A nonconventional extension is taken of the physical bounded angular domains descriptive of oscillatory waves into the nonphysical unbounded angular domains descriptive of traveling waves, with the relation between the two domains established via an infinite set of image sources placed in the infinite domain: it changes the discrete wavenumber spectra associated with conventional angular harmonics into spectral continua of traveling waves, thereby facilitating ray acoustic parameterizations without intervention of the conventional Sommerfeld-Watson transform. Dissert. Abstr.

N92-12598*# National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.
HELICOPTER MAIN-ROTOR SPEED EFFECTS: A COMPARISON OF PREDICTED RANGES OF DETECTION FROM THE AURAL DETECTION PROGRAM ICHIN AND THE ELECTRONIC DETECTION PROGRAM ARCAS
Arnold W. Mueller and Charles D. Smith (Lockheed Engineering and Sciences Co., Hampton, VA.) Sep. 1991 16 p
(NASA-TM-104134; NAS 1.15:104134) Avail: NTIS HC/MF A03 CSCL 20A

NASA LaRC personnel have conducted a strudy of the predicted acoustic detection ranges associated with reduced helicopter main rotor speeds. This was accomplished by providing identical input information to both the aural detection program ICHIN 6, (I Can Hear It Now, version 6) and the electronic acoustic detection program ARCAS (Assessment of Rotorcraft Detection by Acoustics Sensing). In this study, it was concluded that reducing the main rotor speed of the helicopter by 27 percent reduced both the predicted aural and electronic detection ranges by approximately 50 percent. Additionally, ARCAS was observed to function better with narrowband spectral input than with one-third octave band spectral inputs and the predicted electronic range of acoustic detection is greater than the predicted aural detection range. Author

N92-12599# Aeronautical Research Inst. of Sweden, Stockholm. Structure Dept.
ACOUSTIC CHARACTERISTICS OF ANECHOIC CHAMBER AT FFA
Lars Gustavsson Nov. 1990 57 p
(FFA-TN-1990-43; ETN-91-90284) Avail: NTIS HC/MF A04

The acoustical characteristics of the FFA (Swedish aeronautical research institute) anechoic chamber are described. The chamber is measured according to the requirements of ISO standard 3745 as a precision anechoic chamber. It is shown that these requirements are fulfilled in the frequency range 80 to 10,000 Hz, with a distance between the source and the microphone up to 10 m. The report may be used to choose the best measure path in the chamber at each frequency, which is especially useful at other frequencies than those which are defined in ISO 3745. Different absorbing treatments applied to the rail construction are analyzed and useable treatments are suggested. Measure paths are described in the frequency range 40 to 80 Hz, which do not fulfill the requirements in ISO 3745 but still could be used at propagation measurements with lower requirements than according to ISO 3745. ESA

N92-12600# Aeronautical Research Inst. of Sweden, Stockholm. Aerodynamics Dept.
FREDHOLM'S ALTERNATIVE FOR IMPEDANCE BOUNDARY VALUE PROBLEMS IN ACOUSTICS
Peter Wilde May 1991 21 p Sponsored in part by Swedish National Board for Technical Development
(FFA-TN-1990-46; ETN-91-90285) Avail: NTIS HC/MF A03

Impedance or Robin boundary value problems are considered for the scalar Helmholtz equation. Using boundary integral equation methods existence theorems are obtained in form of Fredholm's alternative. ESA

N92-12601# Aeronautical Research Inst. of Sweden, Stockholm. Aeronautics Dept.
AEROACOUSTICS IN INHOMOGENEOUS FLOW FIELD
Peje Loefgren Aug. 1991 20 p
(Contract STU-90-03619P)
(FFA-TN-1991-30; ETN-91-90289) Avail: NTIS HC/MF A03

A contribution to the study of the possibility to extend an existing computational method for aeroacoustics in a homogeneous flow field to more general cases of inhomogeneous flow is given. The existing method is characterized by the use of convolution technique, at which the fundamental solution of the wave equation plays an important role. A linear first order Partial Differential Equation (PDE) system, valid in the weak sense in the whole of space time, is derived for aeroacoustics in a stationary inhomogeneous flow field. Because of the inhomogeneity some of the coefficients of the system are not constants, which excludes the possibility to eliminate the perturbations velocity in order to get a single equation for the perturbation mass density (as in the homogeneous case) as well as the possibility to solve the system by conventional convolution technique. ESA

N92-12602# Sandia National Labs., Albuquerque, NM.
DESIGN AND TESTING OF SPACE-DOMAIN MINIMUM AVERAGE CORRELATION ENERGY (SMACE) FILTERS FOR 2-D ACOUSTO-OPTIC CORRELATORS
J. M. Connelly, B. V. K. VijayaKumar (Carnegie-Mellon Univ., Pittsburgh, PA.), P. A. Molley, K. T. Stalker, and B. A. Kast 1991 21 p Presented at the Society of Photo-Optical Instrumentation Engineers (SPIE) Meeting, San Diego, CA, 21-26 Jul. 1991
(Contract DE-AC04-76DP-00789)
(DE91-019062; SAND-91-2046C; CONF-9107115-48) Avail: NTIS HC/MF A03

Two-dimensional Acousto-Optic (AO) correlators differ from the frequency plane correlators in that multiplying, shifting, and adding, rather than Fourier transforming are used to obtain the correlations. Thus, many of the available composite filter design techniques are not aimed at designing filters for use in AO correlators since they yield frequency-domain functions. A method is introduced for designing filter impulse responses of arbitrary extents for implementation on AO correlators. These filters are designed to yield sharp correlation peaks. Simulation results are included to illustrate the viability of the proposed approach. Also included are some initial results from the first successful use of grey-level composite filters on an AO correlator. DOE

72 ATOMIC AND MOLECULAR PHYSICS

Includes atomic structure, electron properties, and molecular spectra.

N92-12603# Northeastern Univ., Boston, MA.
TOPICS IN GAUGE THEORIES AND THE UNIFICATION OF ELEMENTARY PARTICLE INTERACTIONS
Y. N. Srivastava and M. T. Vaughn Feb. 1990 9 p
(Contract DE-FG02-85ER-40233)
(DE90-013435; DOE/ER-40233/5) Avail: NTIS HC/MF A02

We report on work done by the principal investigators (Y. N. Srivastava and M. T. Vaughn) and their collaborators on non-scaling phenomena in very high energy, low p(sub t) physics, signatures for excited leptons and quarks, vacuum polarization effects in QED and in the standard model for macroscopic systems, anomalous decays of the Z(sup 0), computer graphic representations of topological solutions to classical field equations, and of iterated maps, and renormalization group analysis of unified gauge theories. DOE

N92-12604# Brandeis Univ., Waltham, MA. Dept. of Physics.
RESEARCH IN ELEMENTARY PARTICLE PHYSICS
L. E. Kirsch, H. J. Schnitzer, L. F. Abbott, J. R. Bensinger, and C. A. Blocker 1990 20 p
(Contract DE-AC02-76ER-03230)
(DE90-013443; DOE/ER-03230/T9) Avail: NTIS HC/MF A03

The following subject areas are discussed: CDF (cumulative distribution functions) analysis; CDF system support; SSC laboratory development; solenoidal detector collaboration program; meson spectroscopy; conformal field theory; wormholes in quantum gravity; and neural networks. DOE

N92-12605# Los Alamos National Lab., NM.
LOCAL STATES IN ONE-DIMENSIONAL CDW (CHARGE DENSITY WAVE) MATERIALS: SPECTRAL SIGNATURES FOR POLARONS AND BIPOLARONS IN MX CHAINS
B. Swanson, R. J. Donohoe, L. A. Worl, A. D. F. Bulou, C. A. Arrington, J. T. Gammel, A. Saxena, and A. R. Bishop 1990 10 p Presented at the Symposium on Photoinduced Charge Transfer in Molecular Crystals and Liquid Crystals, Rochester, NY, 6-9 Jun. 1990
(Contract W-7405-eng-36)
(DE90-013150; LA-UR-90-2166; CONF-9006218-1) Avail: NTIS HC/MF A02

We have undertaken a combined theoretical and experimental effort directed toward the examination of both the ground and defect states in halide-bridged mixed-valence metal linear chains materials as they are tuned within and between broken symmetry phases. Novel low-dimensional highly correlated electronic materials offer a difficult theoretical challenge as we must span from a description of electronic structure on a molecular scale to the meso scale structure that is intrinsic to these solids. Our theoretical effort at Los Alamos combines quantum chemistry, band structure calculations, and many body modeling using Peierls-Hubbard Hamiltonians in order to model ground and local states. The experimental effort combines synthesis and a variety of microscopic structural and spectroscopic probes and macroscopic measurements in an effort to fully characterize both ground and local states as these materials are tuned in the phase boundary regions between broken symmetry states. The present article summarizes some of our recent research using optical spectroscopy to obtain signatures of photoexcited and intrinsic local states and compares these experimental results with Peierls-Hubbard calculations of the optical properties of these materials. Details concerning the theoretical and experimental approaches can be found elsewhere. DOE

N92-12606# Oak Ridge National Lab., TN.
ELECTRON TRANSPORT IN FAST DIELECTRIC LIQUIDS AT HIGH APPLIED ELECTRIC FIELDS
H. Faidas, D. L. McCorkle (Tennessee Univ., Knoxville.), and L. G. Christophorou 1990 6 p Presented at the 10th International Conference on Conduction and Breakdown in Dielectric Liquids, Grenoble, France, 10-14 Sep. 1990
(Contract DE-AC05-84OR-21400)
(DE90-009815; CONF-9009125-1) Avail: NTIS HC/MF A02

The drift velocity, w, of excess electrons as a function of the applied uniform electric field, E, in liquid 2,2-dimethyl propane (TMC), tetramethyl silane (TMS), tetramethyl germanium (TMG), tetramethyltin (TMT), 2,2,4,4- tetramethyl pentane (TMP) and in mixtures of TMS with TMP (mole ratio M = 1.31/1) and n-pentane (M = 102/1, 17/1, and 5.6/1) has been measured for E-values up to approximately 10(exp 5) V/cm. The thermal electron mobility in the above liquids is 71.5, 119.3, 114.7, 85.7, 31.8, 39.1, 118, 85, and 47.6 sq cm/s V(exp -1), respectively. DOE

N92-12607# Stanford Linear Accelerator Center, CA.
PRECISION EXPERIMENTS IN ELECTROWEAK INTERACTIONS
Morris L. Swartz Mar. 1990 81 p Presented at the 17th SLAC Summer Institute on Particle Physics: Physics at the 100 GeV Mass Scale, Stanford, CA, 10-21 Jul. 1989
(Contract DE-AC03-76SF-00515)
(DE90-013568; SU-SLAC-PUB-5219; CONF-8907134-11) Avail: NTIS HC/MF A05

The electroweak theory of Glashow, Weinberg, and Salam (GWS) has become one of the twin pillars upon which our understanding of all particle physics phenomena rests. It is a brilliant achievement that qualitatively and quantitatively describes all of the vast quantity of experimental data that have been accumulated over some forty years. Note that the word quantitatively must be qualified. The low energy limiting cases of the GWS theory, Quantum Electrodynamics and the V-A Theory of Weak Interactions, have withstood rigorous testing. The high energy synthesis of these ideas, the GWS theory, has not yet been subjected to comparably precise scrutiny. The recent operation of a new generation of proton-antiproton and electron-positron colliders has made it possible to produce and study large samples of the electroweak gauge bosons W(exp + or -) and Z(exp 0). We expect that these facilities will enable very precise tests of the GWS theory to be performed in the near future. In keeping with the theme of this Institute, Physics at the 100 GeV Mass Scale, these lectures will explore the current status and the near future prospects of these experiments. DOE

N92-12608# California Univ., Berkeley. Lawrence Berkeley Lab.
QUANTUM MONTE CARLO FOR ATOMS AND MOLECULES Ph.D. Thesis
R. N. Barnett Nov. 1989 239 p
(Contract DE-AC03-76SF-00098)
(DE90-013793; LBL-28994) Avail: NTIS HC/MF A11

The diffusion quantum Monte Carlo with fixed nodes (QMC) approach has been employed in studying energy eigenstates for 1 to 4 electron systems. Previous work employing the diffusion QMC technique yielded energies of high quality for H2, LiH, Li2, and H2O. Here, the range of calculations with this new approach has been extended to include additional first-row atoms and molecules. In addition, improvements in the previously computed fixed-node energies of LiH, Li2, and H2O have been obtained using more accurate trial functions. All computations were performed within, but are not limited to, the Born-Oppenheimer approximation. In our computations, the effects of variation of Monte Carlo parameters on the QMC solution of the Schroedinger equation were studied extensively. These parameters include the time step, renormalization time and nodal structure. These studies have been very useful in determining which choices of such parameters will yield accurate QMC energies most efficiently. Generally, very accurate energies (90 to 100 percent of the correlation energy is obtained) have been computed with single determinant trail functions multiplied by simple correlation functions. Improvements in accuracy should be readily obtained using more complex trial functions. DOE

N92-12609# Rochester Univ., NY.
NUCLEAR STRUCTURE THEORY
J. B. French and D. S. Koltun Jun. 1990 10 p
(Contract DE-FG02-88ER-40425)
(DE90-013949; DOE/ER-40425/249) Avail: NTIS HC/MF A02

This report summarizes progress during the past ten months in the following areas of research: pion double charge exchange reactions, including a theory of the isotensor term in the pion-nucleus optical potential, and a study of meson exchange contributions to the reactions at low energies. Nuclear inelastic scattering, using quark models to calculate nuclear structure functions, and to test for sensitivity to the substructure of nucleons in nuclei. Fluctuation-free statistical spectroscopy including the theory and computer programs for interacting-particle densities, spin cutoff factors, occupancies, strength sums, and other expectation values. DOE

N92-12610# Oak Ridge National Lab., TN.
DETECTION SYSTEM CHARACTERISTICS USING Cf-252 IONIZATION CHAMBERS
J. T. Mihalczo, N. W. Hill, E. D. Blakeman, and V. K. Pare 1990 13 p Presented at the 7th Symposium on Radiation Measurements and Applications, Ann Arbor, MI, 21-24 May 1990
(Contract DE-AC05-84OR-21400)
(DE90-011702; CONF-900563-9) Avail: NTIS HC/MF A03

Because the number of neutrons and gamma rays and the energy spectrum of particles from spontaneous fission are well characterized for Cf-252, it can be used as a timed source of fission neutrons and gamma rays. The first such usage incorporated a Cf-252 source into gas scintillators. This paper describes a timed source of neutrons and gamma rays made by depositing Cf-252 on one electrode of a parallel plate ionization chamber that can then be used for determining detection-system characteristics. The emission time of neutrons from spontaneous fission has also been determined by recording the emission time of prompt gamma rays from a Cf-252 source (not incorporated into a detector) adjacent to the surface of a solid or liquid scintillator. This well characterized source of neutrons can thus be used as a randomly pulsed source for a variety of applications. This paper illustrates the use of this type of source to determine the time resolution of detection systems, the efficiency for detection of neutrons between 0.5 and 5 MeV, the effectiveness of pulse shape discrimination systems, and the overall efficiency for detection of prompt fission gamma rays. DOE

N92-12611# California Univ., Berkeley. Lawrence Berkeley Lab. SSC Central Design Group.
ION STABILITY IN BUNCHED ELECTRON BEAMS
D. Douglas 1990 2 p
(Contract DE-AC02-89ER-40486)
(DE90-014087; SSC-23) Avail: NTIS HC/MF A01

Accumulation of ions can adversely affect the performance of an electron storage ring. Stability of ion motion under the influence of passing bunches is often used to predict if ion accumulation will occur in a particular storage ring design. This stability question has been previously studied with a linear model. We present a nonlinear numerical tool to study ion motion in a beam of short bi-gaussian electron bunches. Results of ion trapping studies on a model electron storage ring are presented. We find that including nonlinear effects may not significantly alter the conclusions of the linear model, and that in a ring containing many bunches a gap in the bunch train effectively destabilizes ion motion. DOE

N92-12612# Texas Univ., Austin. Inst. for Fusion Studies.
FINITE ORBIT ENERGETIC PARTICLE LINEAR RESPONSE TO TOROIDAL ALFVEN EIGENMODES
H. L. Berk, Huanchun Ye, and B. N. Breizman (Academy of Sciences, USSR, Novosibirsk) Jul. 1991 12 p
(Contract DE-FG05-80ET-53088)
(DE91-018418; DOE/ET-53088/507; IFSR-507) Avail: NTIS HC/MF A03

The linear response of energetic particles to the toroidal Alfven eigenmodes (TAE) modes is calculated taking into account their finite orbit excursion from the flux surfaces. The general expression reproduces the previously derived theory for small banana width: when the banana width delta(sub b) is much larger than the mode thickness delta(sub m), we obtain a new compact expression for the linear power transfer. When delta(sub m)/delta(sub b) is much less than 1, the banana orbit effect reduces the power transfer by a factor of delta(sub m)/delta(sub b) from that predicted by the narrow orbit theory. A comparison is made of the contribution to the TAE growth rate of energetic particles with a slowing-down distribution arising from an isotropic source, and a balance-injected beam source when the source speed is close to the Alfven speed. For the same stored energy density, the contribution from the principal resonances (absolute value of upsilon(parallel) = upsilon(sub A) is substantially enhanced in the beam case

compared to the isotropic case, while the contribution at the higher sidebands (absolute value of upsilon(parallel) = upsilon(sub A)/(2l - 1) with l greater than or = 2) is substantially reduced. DOE

N92-12613# Ecole Nationale Superieure des Telecommunications, Paris (France). Dept. Images.
RECOGNITION OF THREE DIMENSIONAL SHAPES: APPLICATION TO CHEMICAL MOLECULES Ph.D. Thesis [RECONNAISSANCE DE FORMES TRIDIMENSIONNELLES: APPLICATIONS AUX MOLECULES CHIMIQUES]
Isabelle Bloch 1990 288 p In FRENCH; ENGLISH summary
(TELECOM-Paris-90-E-018; ISSN-0751-1353; ETN-91-90121)
Copyright Avail: NTIS HC/MF A13

The development of a methodology for the analysis and recognition of nonpolyhedral smooth and non-specific geometric shapes (such as the human body or molecule shapes) which can then be applied to Computer Aided Molecular Modeling (CAMM) is addressed. The method is based on two stage matching and for its development, a theoretical as well as an algorithmic development, is required for each stage. The method offers direction for future work in application areas such as medical imaging and theoretical aspects such as association with other methods. ESA

N92-12614# Flinders Univ., Bedford Park (Australia). Electronic Structure of Materials Centre.
RECENT (e,2e) STUDIES: LASER EXCITED ATOMS, AUTOIONIZATION, AUGER PROCESSES, AND THIN FILMS
E. Weigold Dec. 1990 12 p Presented at the 27th European Energy Signature Monitor (ESM) Workshop, Rome (Italy), Nov. 1990
(DE91-634156; ESM-27; CONF-9011206) Avail: NTIS HC/MF A03

The (e,2e) process, in which the kinematics of the electrons involved in an ionizing collision are completely determined, is capable of revealing a rich variety of information. Depending on the kinematics employed, it is possible to investigate in detail either the ionization mechanism itself or to use the reaction to elucidate the structure of the target system and the ion. When used to investigate structure, the technique is now generally known as electron momentum spectroscopy (EMS). The results of various recent (e,2e) measurements carried out at Flinders University are reported. These include the first measurements of the electron momentum distributions of excited target state, the first measurements of the momentum distributions from an oriented target atom, the detailed measurements of correlations in the autoionizing region of helium, correlations in the inner shell ionization of argon, and finally the measurement of spectral momentum densities for amorphous carbon. DOE

N92-12615# Colorado Univ., Boulder. Dept. of Physics.
THEORETICAL NUCLEAR PHYSICS
1991 41 p
(Contract DE-FG02-87ER-40335)
(DE92-000022; DOE/ER-40335/6) Avail: NTIS HC/MF A03

This report discussed the following topics: Consistent RHA-RPA for finite nuclei; vacuum polarization in a finite system; isovector correlations in QHD description of nuclear matter; nuclear response functions in quasielastic electron scattering; charge density differences for nuclei near Pb-208 in quantum hadro-dynamics; excitation of the 10.957 MeV 0(-); T=0 state in O-16 by 400 MeV protons; deformed chiral nucleons; new basis for exact vacuum calculations in 3-spatial dimensions; second order processes in the (e,e(prime)d) reaction; scalar and vector contributions to (bar p)p (yields) (bar (Lambda))(Lambda) and (bar p)p (yields) (bar (Lambda))(Sigma)(sup 0) + c.c; and radiative capture of protons by light nuclei at low energies. DOE

N92-12616# Technische Hochschule, Darmstadt (Germany, F.R.). Fachbereich Physik.
EXCESS MIXING VOLUMES AND SPECIFIC INTERACTIONS IN ORGANIC MOLECULE MIXING Ph.D. Thesis [EXZESSMISCHUNGSVOLUMEN UND SPEZIFISCHE WECHSELWIRKUNGEN IN MISCHUNGEN ORGANISCHER MOLEKUELE]
Michael Wolf 1990 104 p In GERMAN
(ETN-91-90171) Avail: NTIS HC/MF A06

The changes in volume, which follow the mixing of polymer systems are evaluated experimentally and described theoretically. Oligomer mixing, oligomer solutions, and polymer/polymer mixing are examined. The equation of state theory allows the theoretical description of excess mixing volumes in polymer systems. Mixing properties are described, with regard to characteristic molecular properties of the pure components and to their interactions. The comparison between experimental and theoretical values for the excess mixing volumes shows that the equation of state theory in its derived form, does not predict the size of the excess mixing volume, and in many cases the operational sign. The extension of the equation of state theory describes the excess mixing volumes obtained, using model systems. ESA

N92-12617# Technische Hochschule, Darmstadt (Germany, F.R.). Fachbereich Physik.
EXAMINATION OF EXCITATION AND DECAY OF GIANT RESONANCES IN Ca-40 BY (E,E'X) COINCIDENCE EXPERIMENTS Ph.D. Thesis [UNTERSUCHUNG VON ANREGUNG UND ZERFALL DER RIESENRESONANZEN IN CA40 DURCH (E,E'X)-KOINZIDENZEXPERIMENTE]
Ulrich Helm 1990 146 p In GERMAN
(ETN-91-90174) Avail: NTIS HC/MF A07

An experiment is presented, with a view to showing electron particle coincidence, using a microtron. The electrons were detected in a 180 degree magnetospectrometer and the charged particles, e.g., protons and alpha particles in semiconductor telescopes. A multipole analysis of four pi integrated coincident electrospectra was carried out. The decay of dipole giant resonance is observable in the single residual nucleus states. The reaction mechanism of giant resonance decay is examined by fluctuation analysis. The cross correlation arialysis between the various decay channels gives high correlation coefficients in the domain of discrete states, whereas the single decay channels are almost uncorrelated in the field of dipole giant resonances. ESA

N92-12618# Technische Hochschule, Darmstadt (Germany, F.R.). Fachbereich Physik.
KINEMATIC MEASUREMENT OF ALPHA PARTICLES ACCOMPANIED BY SPONTANEOUS FISSION OF Cf-252 Ph.D. Thesis [KINEMATISCHE MESSUNG DER ALPHA-TEILCHEN: BEGLEITETEN SPONTANSPALTUNG VON CF252]
Peter Heeg 1990 117 p In GERMAN
(ETN-91-90175) Avail: NTIS HC/MF A06

The energies and relative angles of three particles and the specific energy loss of light particles were recorded for each of more than 100,000 measured events. The comparison of measured distributions with former results gave good agreement, with regard to the integral mean values of energy, angle and mass distribution. The comparison of binary fragments with ternary fragment mass spectra showed that the ternary process is not a binary fission with ensuing alpha emission. The fragments are less stimulated in the ternary process, than in the binary process. Deformation energy is asymmetrically distributed at the fission point. ESA

N92-12619# Technische Hochschule, Darmstadt (Germany, F.R.). Fachbereich Physik.
QUASI PARTICLES AND FERMI SURFACES OF HEAVY FERMION SYSTEMS Ph.D. Thesis [QUASITEILICHEN UND FERMI-FLAECHEN VON SCHWERE-FERMIONEN-SYSTEMEN]
Erich Karl Rainer Runge 1990 210 p In GERMAN
(ETN-91-90180) Avail: NTIS HC/MF A10

It is shown that reliable calculations of quasi particle dispersion and Fermi surfaces of real heavy fermion materials are possible.

The existence of several Fermi surface constituents is presupposed. Most experiments in heavy fermion systems are interpreted, using relations which are valid for the translation invariant Fermi fluidity, e.g., the case of a single Fermi sphere. A simple multiparticle model system is examined, in order to discuss the weaknesses and strengths of single multiparticle theoretical methods treating strongly correlated electronic systems. Characteristics of heavy fermion systems with atoms of more than one electron are discussed. The relation of renormated band structure theory to conventional bandstructure computation process is represented in detail. ESA

N92-12620# Imperial Coll. of Science and Technology, London (England). Dept. of Aeronautics.
RECIPROCITY THEORY OF MANY-BODY INTERACTIONS
Adolf A. Agbormbai Jan. 1990 33 p
(IC-Aero-90-01; ISSN-0308-7247; ETN-91-90299) Avail: NTIS HC/MF A03

The reciprocity approach is applied to the problem of many body interactions in which an arbitrary number of molecules simultaneously collide with one another at the same impact point in physical space. First, the relevant features in the theory of binary collisions are reviewed, and then the problem of three bodies is considered. It is shown that this reduces to the motion of two particles in the center of mass frame, in contrast to the binary problem which reduces to the motion of a single particle in this frame of reference. It is shown how the three body analysis may be generalized to incorporate an arbitrary number of bodies. In particular, the N body problem is shown to reduce to the motion of N-1 bodies in the center of mass system each of which scatters in the manner described above as well as interchange energy with the others. For the inelastic encounters in which internal energy excitations occur, the problem is decomposed into an internal transational energy exchange superposed on the elastic scattering. The internal-external exchange is formulated statistically via the principle of reciprocity at equilibrium. Techniques are illustrated only for three body collisions, the aim being to formulate a reciprocity equation from which the statistical models of the exchange may be constructed. ESA

N92-12621# Technische Univ., Eindhoven (Netherlands). Dept. of Physics.
FEW-BODY COLLISIONS IN A WEAKLY INTERACTING BOSE GAS Ph.D. Thesis
Hendricus Theodorus Stoof 1989 96 p
(ETN-91-90307) Avail: NTIS HC/MF A05

Bose-Einstein condensation as a spontaneous symmetry breaking phenomenon is considered. Spin polarized atomic hydrogen and hydrogen atoms as composite bosons are discussed. Two and three body collisional processes are studied by analysis of relaxational processes in atomic traps and by three body recombination, which is the dominant decay mechanisms in the high density schemes for the achievement of the Bose-Einstein condensed state. For individual titles, see N92-12622 through N92-12627.

N92-12622# Technische Univ., Eindhoven (Netherlands). Dept. of Physics.
SPIN-EXCHANGE AND DIPOLE RELAXATION RATES IN ATOMIC HYDROGEN: RIGOROUS AND SIMPLIFIED CALCULATIONS
Hendricus Theodorus Stoof, J. M. V. A. Koelman, and B. J. Verhaar *In its* Few-Body Collisions in a Weakly Interacting Bose Gas 1989 p 24-33 Repr. from Physical Review B (American Physical Society), v. 38, no. 7, 1 Sep. 1988 p 4688-4697 Sponsored by Netherlands Organization for the Advancement of Pure Research (For primary document see N92-12621 03-72)
Avail: NTIS HC/MF A05

The magnetic field and temperature dependence of the rate for all two body spin exchange and dipolar transitions among hyperfine levels in cryogenic hydrogen gas is calculated by means of the coupled channels method. A description of this method and its practical application is presented. A simple interpretation of the rates is given, in some cases with associated simple closed form formulas, based on the degenerate internal states approximation. ESA

N92-12623# Harvard Univ., Cambridge, MA. Physics Lab.
TRAPPING OF NEUTRAL ATOMS WITH RESONANT MICROWAVE RADIATION
Charles C. Agosta, Isaac F. Silvera, Hendricus Theodorus Stoof, and B. J. Verhaar (Technische Univ., Eindhoven, Netherlands) *In* Technische Univ., Few-Body Collisions in a Weakly Interacting Bose Gas 1989 p 36-39 Repr. from Physical Review Letters (American Physical Society), v. 62, no. 20, 15 May 1989 p 2361-2364 (For primary document see N92-12621 03-72)
(Contract DE-FG02-85ER-45190; NATO-0543/88)
Avail: NTIS HC/MF A05

A resonant microwave trap for neutral atoms is discussed. Because of the long spontaneous radiation time this trap is remarkably different from the optical trap. It also has advantages over static magnetic traps that trap the excited spin state of the lowest electronic level, in that atoms predominantly in the spin ground state can be trapped. The relaxation ejection lifetime of atoms in such a trap is analyzed using the formalism of dressed atomic states. Results are applied to atomic hydrogen and the possiblity of Bose-Einstein condensation is considered. ESA

N92-12624# Technische Univ., Eindhoven (Netherlands). Dept. of Physics.
DECAY OF SPIN-POLARIZED ATOMIC HYDROGEN IN THE PRESENCE OF A BOSE CONDENSATE
Hendricus Theodorus Stoof, A. M. L. Janssen, J. M. V. A. Koelman, and B. J. Verhaar *In its* Few-Body Collisions in a Weakly Interacting Bose Gas 1989 p 42-54 Repr. from Physical Review A (American Physical Society), v. 39, no. 6, 15 Mar. 1989 p 3157-3169 (For primary document see N92-12621 03-72)
Avail: NTIS HC/MF A05

The decay of magnetically trapped doubly spin polarized atomic hydrogen is studied in the density and temperature regime of the Bose Einstein phase transition and the temperature and magnetic field dependence of all relavant relaxation rate constants are calculated. At the transition temperature (T sub c) the rate constants have discontinuous second derivative with respect to T. Below T sub c, they show a pronounced decrease relative to the extrapolated above T sub c values, the observation of which is a clear signal for the experimental realization of Bose Eintein condensation. ESA

N92-12625# Technische Univ., Eindhoven (Netherlands). Dept. of Physics.
NONSINGULAR INTEGRAL EQUATION FOR TWO-BODY SCATTERING AND APPLICATIONS IN TWO AND THREE DIMENSIONS
Hendricus Theodorus Stoof, L. P. H. deGoey, W. M. H. M. Rovers, P. S. M. Kop Jansen, and B. J. Verhaar *In its* Few-Body Collisions in a Weakly Interacting Bose Gas 1989 p 56-65 Repr. from Physical Review A (American Physical Society), v. 38, no. 3, 1 Aug. 1988 p 1248-1257 Sponsored by Netherlands Organization for the Advancement of Pure Research (For primary document see N92-12621 03-72)
Avail: NTIS HC/MF A05

A new nonsingular scattering integral equation, which is suitable for the investigation of the total (also off shell) transition matrix in arbitrary dimension n greater than or = 2 is introduced. In particular, the low energy properties are derived and lead, in connection with spin polarized atomic hydrogen, to the low temperature behavior of two and three body surface processes. In addition, for three dimensional, the method leads in a natural way to a separable approximation of the T matrix for all energies, with the possibility of formulating a procedure for optimizing this approximation. To show the practicability of the equation, numerical results for both n = 2 and n = 3 are presented. ESA

N92-12626# Technische Univ., Eindhoven (Netherlands). Dept. of Physics.
SPIN-POLARIZED ATOMIC HYDROGEN IN VERY STRONG MAGNETIC FIELDS
Hendricus Theodorus Stoof, L. P. H. deGoey, B. J. Verhaar, and W. Gloeckle (Ruhr Univ., Bochum, Germany, F.R.) *In its* Few-Body Collisions in a Weakly Interacting Bose Gas 1989 p 68-71 Repr. from Physical Review B (American Physical Society), v. 38, no. 16, 1 Dec. 1988 p 11,221-11,224 Sponsored by Netherlands Organization for the Advancement of Pure Research (For primary document see N92-12621 03-72)
Avail: NTIS HC/MF A05

The effective rate constant for three body dipolar recombination of spin polarized atomic hydrogen is calculated in conditions of high density and very high magnetic field strengths (beyond the less than 10-T range of previous calculations). The decay of the gas sample is found to be not sufficiently suppressed at magnetic fields available in the foreseeable future. ESA

N92-12627# Technische Univ., Eindhoven (Netherlands). Dept. of Physics.
RESONANCES IN RECOMBINATION OF ATOMIC HYDROGEN DUE TO LONG-RANGE H3 MOLECULAR STATES
Hendricus Theodorus Stoof, B. J. Verhaar, L. P. H. deGoey, and W. Gloeckle (Ruhr Univ., Bochum, Germany, F.R.) *In its* Few-Body Collisions in a Weakly Interacting Bose Gas 1989 p 74-88 Sponsored in part by Netherlands Organization for the Advancement of Pure Research, and Government of the Land Nordrhein-Westfalen, Fed. Republic of Germany (For primary document see N92-12621 03-72)
(Grant NATO-0543/88)
Avail: NTIS HC/MF A05

A calculation of the effective rate constant for three body recombination is presented, taking for the first time rearrangement into account. A pronounced resonance structure as a function of magnetic field due to long range revibrational states of H3 in an almost equilateral configuration is found. This structure is superposed on a rather flat background with a slow decrease below 10T. The results are compared with the experiment. ESA

N92-12628# Technische Univ., Eindhoven (Netherlands).
NOVEL APPROACHES TO THE CALCULATION OF THE ELECTRONIC STRUCTURE AND DYNAMICS OF EXCITED STATES: APPLICATION TO TRANS-DI-IMIDE AND ETHYLENE Ph.D. Thesis
Gerrit Cornelis Groenenboom 1991 131 p
(ETN-91-90309) Avail: NTIS HC/MF A07

A review on calculating the vibrational structure of electronic spectra using Heller's time dependent formulation, electronic structure calculations and dynamical methods are given. An exploratory study of a trans-di-imide spectrum is described. The Lanczos/grid method and the MRCEPA (Multi Reference Coupled Electronic Pair Approximation) method are described, and results of test calculations are given. These methods are used to study the (V back arrow N) band of ethylene. For individual titles, see N92-12629 through N92-12632.

N92-12629# Technische Univ., Eindhoven (Netherlands).
SEMICLASSICAL CALCULATION OF THE VIBRATIONAL STRUCTURE OF THE (B) 1B(SUB u) RYDBERG STATE OF TRANS-DI-IMIDE FROM AB INITIO CI POTENTIAL ENERGY SURFACES
Gerrit Cornelis Groenenboom, J. H. venLenthe, and H. M. Buck *In its* Novel Approaches to the Calculation of the Electronic Structure and Dynamics of Excited States: Application to Trans-Di-Imide and Ethylene 1991 p 23-42 Repr. from J. Chem. Phys., v. 91, no. 3027, 1989 (For primary document see N92-12628 03-72)
Avail: NTIS HC/MF A07

The applicability of the SDCI (Singles and Doubles Configuration Interaction) and CEPA (Coupled Electronic Pair Approximation) methods to the excited state of the title molecule is investigated. Two basis sets are used, one of triple zeta quality extended with diffuse functions and another which also contains polarization functions. For the subsequent CI calculations closed shell as well as open shell molecular orbitals are used. The Pople correction is investigated as a way to obtain size consistent results from the SDCI calculation. It is concluded to be important to use the open shell molecular orbital basis and the SDCI plus Pople correction, or even better, the CEPA. Both methods give good results for the vertical transition energy and excited state geometry. The error in the vibrational frequencies is in the order of 10 , but the NN stretch mode is best described by the CEPA method. ESA

N92-12630# Technische Univ., Eindhoven (Netherlands).
SOLVING THE DISCRETIZED TIME-INDEPENDENT SCHROEDINGER EQUATION IN THE LANCZOS PROCEDURE
Gerrit Cornelis Groenenboom and H. M. Buck *In its* Novel Approaches to the Calculation of the Electronic Structure and Dynamics of Excited States: Application to Trans-Di-Imide and Ethylene 1991 p 43-57 Repr. from J. Chem. Phys., v. 92, no. 4374, 1990 (For primary document see N92-12628 03-72)
Avail: NTIS HC/MF A07

A method to find bound state solutions of the one, two or three dimensional Schroedinger equation is presented. The equation is turned into a sparse matrix eigenvalue problem by representing the potential energy surface and the wave function on a grid. The Laplacian is represented by a high (10th) order finite difference formula. Eigenvalues are found by the Lanzos procedure and transition probabilities (Franck-Condon factors) are found by the recursive residue generation method. Examples for the one dimensional morse oscillator and the two dimensional Henon-Heiles potential are given. Numerical convergence can be checked easily and highly accurate results can be obtained. The algorithm is fast, easy to implement, and vectorizable. ESA

N92-12631# Technische Univ., Eindhoven (Netherlands).
CEPA-TYPE SIZE CONSISTENCY CORRECTIONS FOR MRSDCI CALCULATIONS, MRCEPA
P. J. A. Ruttink, J. H. vanLenthe, R. Zwaans, and Gerrit Cornelis Groenenboom *In its* Novel Approaches to the Calculation of the Electronic Structure and Dynamics of Excited States: Application to Trans-Di-Imide and Ethylene 1991 p 59-81 Submitted for publication (For primary document see N92-12628 03-72)
Avail: NTIS HC/MF A07

A new size consistent extension to the multireference CI (Configuration Integration) method is described. The method termed Multi Reference Coupled Electron Pair Approximation (MRCEPA), is akin to a multireference CEPA (0) approach, though nonlinear terms do receive separate attention. The performance of the approach is shown in some model systems as well as in an application to calculation of ground and excited pi(pi) states of ethylene. ESA

N92-12632# Technische Univ., Eindhoven (Netherlands).
THREE-DIMENSIONAL QUANTUM CALCULATIONS ON THE GROUND AND EXCITED STATE VIBRATIONS OF ETHYLENE
Gerrit Cornelis Groenenboom *In its* Novel Approaches to the Calculation of the Electronic Structure and Dynamics of Excited States: Application to Trans-Di-Imide and Ethylene 1991 p 83-120 (For primary document see N92-12628 03-72)
Avail: NTIS HC/MF A07

Three dimensional potential energy surfaces of the ground and excited states of ethylene were calculated at the MRCEPA (Multi Reference Coupled Electronic Pair Approximation) level. The modes included are the torsion, the CC stretch, and the symmetric scissors. Full vibrational calculations were performed using the Lanczos/grid method. The avoided crossing between the V and the R state was dealt with in a diabetic model. The ground state results agree within 3 up to the highest vibrational level known experimentally. The origin and the maximum of the V back arrow N band are calculated at 5.68 and 7.82 eV, respectively, approximately 0.2 eV above the somewhat ambiguous experimental values. This work considerably diminishes the existing gap of approximately 0.5 eV between theory and experiment. ESA

N92-12633# Pacific Northwest Lab., Richland, WA.
PROPERTIES OF LIQUID WATER AND CARBON DIOXIDE FROM CONSTANT PRESSURE-CONSTANT TEMPERATURE MOLECULAR DYNAMICS
B. J. Palmer Aug. 1991 14 p Presented at the Chemistry and Physics of Liquids Conference, Plymouth, NH, 12-16 Aug. 1991
(Contract DE-AC06-76RL-01830)
(DE91-018219; PNL-SA-19765; CONF-9108164-1) Avail: NTIS HC/MF A03

Although most experimentalists control experimental conditions by fixing the temperature and pressure, most molecular dynamics (MD) simulations of complicated systems are done by fixing the volume and energy. The energy is easily determined by scaling the atomic velocities to give the desired temperature, but the volume is another matter. Determining the correct volume corresponding to a particular pressure using a series of constant energy simulations is at best a tedious business. It is further complicated by the enormous pressure fluctuations that are present in a system the size of most MD simulations. Fortunately, recent advances in MD simulation techniques, primarily by Andersen and Nose, promise to simplify this process considerably. Constant pressure-constant temperature molecular dynamics (NPTMD) simulations can be used to prepare systems at a previously specified temperature and pressure in a single simulation. A great deal of equilibrium information can also be obtained at the same time, as well as some dynamical quantities. The use of NPTMD in modeling molecular fluids is studied by looking at several models of water and carbon dioxide. DOE

N92-12634# China Nuclear Information Centre, Beijing.
A SCINTILLATION DETECTOR FOR MEASURING INERT GAS BETA RAYS
Hengchang Shi and Yunchang Yu Oct. 1989 5 p In CHINESE; ENGLISH summary
(DE91-630700; CNIC-00319; XNIF-0001) Avail: NTIS HC/MF A01

The inert gas beta ray scintillation detector, which is made of organic high polymers as the base and coated with compact fluorescence materials, is a lower energy scintillation detector. It can be used in the nuclear power plant and radioactive fields as a lower energy monitor to detect inert gas beta rays. Under the conditions of time constant 10 minutes, confidence level is 99.7 percent (3 sigma), the intensity of gamma rays 2.6 x 10(sup -7) C/kg (Co-60), and the minimum detectable concentration (MDC) of this detector for Xe-133 1.2 Bq/L. The measuring range for Xe-133 is 11.1 (similar to) 3.7 x 10(exp 4) Bq/L. After a special measure is taken, the device is able to withstand 3 x 10(exp 5) Pa gauge pressure. In the loss-of-cooolant-accident, it can prevent the radioactive gas of the detector from leaking. This detector is easier to be manufactured and decontaminated. DOE

N92-12635# Comision Nacional de Energia Atomica, Buenos Aires (Argentina). Gerencia de Investigaciones.
COOLING OF IONS TRAPPED IN POTENTIAL WELLS PRODUCED BY ELECTROMAGNETIC RADIATION FIELDS [ENTRIAMIENTO DE IONES CONFINADOS EN TRAMPAS DE POTENCIAL PRODUCIDO POR CAMPOS DE RADIACION ELECTROMAGNETICA]
J. R. Sobehart 1990 25 p In SPANISH
(DE91-631104; CNEA-NT-6/90) Avail: NTIS HC/MF A03

The probability distributions for the ground state and the excited state of a two-level ion trapped in an harmonic potential well are studied. The ion is excited by electromagnetic radiation and relaxes back due to either spontaneous or stimulated emission. The photon statistics is considered Poissonian and the momentum transfer between the electromagnetic field and the ion is assumed discrete. The present results are closely related to the quantum treatment in the heavy particle limit as well as to those derived from previous semiclassical models. DOE

N92-12636# Brookhaven National Lab., Upton, NY.
AN EXPERIMENT TO OBSERVE STRANGE PARTICLE PRODUCTION IN ION COLLISIONS AT THE AGS
S. E. Eisemen, A. Etkin, K. J. Foley, R. W. Hackenburg, R. S. Longacre, W. A. Love, T. W. Morris, E. D. Platner, A. C. Saulys, and S. R. Lindenbaum et al 1991 7 p Presented at the Symposium on High Energy Nuclear Collisions and Quark Gluon Plasma, Kyoto, Japan, 6-8 Jun. 1991
(Contracts DE-AC02-76CH-00016; DE-AC02-83ER-40107; DE-AS05-81ER-40032; DE-AC02-76ER-03274)
(DE92-000135; BNL-46555; CONF-9106274-2) Avail: NTIS HC/MF A02

We present the results of a measurement of neutral vee production with 14.6 x A GeV/c Si beams on Au and Cu targets. The lambda and K(sub s)(sup 0) yields were measured as a function of negative particle multiplicity. Effective temperatures were determined from an exponential fit to the transverse mass distribution. DOE

N92-12637# Fermi National Accelerator Lab., Batavia, IL.
MEASUREMENT OF RHO, THE RATIO OF THE REAL TO IMAGINARY PART OF THE (-p)p FORWARD ELASTIC SCATTERING AMPLITUDE, AT (RADICAL)s = 1.8 TeV
R. Rubinstein Aug. 1991 3 p Presented at the Particles and Fields 1991, Vancouver (Canada), 18-22 Aug. 1991
(Contract DE-AC02-76CH-03000)
(DE92-000155; FNAL/C-91/227; CONF-910881-9) Avail: NTIS HC/MF A01

We have measured rho, the ratio of the real to the imaginary part of antiproton-proton forward elastic scattering amplitude, at (radical)s = 1.8 TeV. Our result, rho = 0.140 +/- 0.069, is consistent with the expected value, and thus no new physics is required. DOE

N92-12638# Los Alamos National Lab., NM. Physics Div.
DIRECT MEASUREMENTS OF NEUTRINO MASS
Robert Graham Hamish Robertson 1991 22 p Presented at the 2d International Symposium on Particles, Strings and Cosmology, Boston, MA, 24-29 Mar. 1991
(Contract W-7405-eng-36)
(DE92-000168; LA-UR-91-3136; CONF-9103166-5) Avail: NTIS HC/MF A03

Some recent developments in the experimental search for neutrino mass are discussed. New data from Los Alamos on the electron neutrino mass as measured in tritium beta decay give an upper limit of 9.3 eV at the 95 percent confidence level. This result is not consistent with the long-standing ITEP result of 26(5) eV within a model-independent range of 17 to 40 eV. It now appears that the electron neutrino is not sufficiently massive to close the universe by itself. Hime and Jelley report finding new evidence for a 17-keV neutrino in the beta-decay of S-35 and Ni-63. Many other experiments are being reported and the situation is still unresolved. DOE

N92-12639# Los Alamos National Lab., NM.
A HIGH-EFFICIENCY NEUTRON COINCIDENCE COUNTER FOR SMALL SAMPLES
M. C. Miller, H. O. Menlove, and P. A. Russo 1991 6 p Presented at the 4th International Conference on Facility Operations/Safeguards Interface, Albuquerque, NM, 29 Sep. - 4 Oct. 1991
(Contract W-7405-eng-36)
(DE92-000183; LA-UR-91-3081; CONF-910901-9) Avail: NTIS HC/MF A02

The inventory sample coincidence counter (INVS) has been modified to enhance its performance. The new design is suitable for use with a glove box sample-well (in-line application) as well as for use in the standard at-line mode. The counter has been redesigned to count more efficiently and be less sensitive to variations in sample position. These factors lead to a higher degree of precision and accuracy in a given counting period and allow for the practical use of the INVS counter with gamma-ray isotopics to obtain a plutonium assay independent of operator declarations

and time-consuming chemicals analysis. A calculation study was performed using the Los Alamos transport code MCNP to optimize the design parameters. DOE

N92-12640# Los Alamos National Lab., NM.
NEUTRON FLUX ENHANCEMENT AT LASREF
W. F. Sommer, P. D. Ferguson, and M. S. Wechsler 1991 16 p Presented at the International Conference on Fusion Reactor Materials, Clearwater, FL, 17-22 Nov. 1991
(Contract W-7405-eng-36)
(DE92-000196; LA-UR-91-3029; CONF-911111-1) Avail: NTIS HC/MF A03

The accelerator at the Los Alamos Meson Physics Facility produces a 1-mA beam of protons at an energy of 800 MeV. Since 1985, the Los Alamos Spallation Radiation Effects Facility (LASREF) has made use of the neutron flux that is generated as the incident protons interact with the nuclei in targets and a copper beam stop. A variety of basic and applied experiments in radiation damage and radiation effects have been completed. Recent studies indicate that the flux at LASREF can be increased by at least a factor of ten from the present level of about 5 E+17 m(exp -2)s(exp -1). This requires changing the beam-stop material from Cu to W and optimizing the geometry of the beam-target interaction region. These studies are motivated by the need for a large volume, high energy, and high intensity neutron source in the development of materials for advanced energy concepts such as fusion reactors. DOE

N92-12641# Los Alamos National Lab., NM. Theoretical Div.
UNITARITY AND PION PRODUCTION IN RELATIVISTIC HEAVY-ION COLLISIONS
L. C. Liu 1991 5 p Presented at the International Workshop on Pions in Nuclei, Penyscola, Spain, 2-9 Jun. 1991
(Contract W-7405-eng-36)
(DE92-000212; LA-UR-91-2988; CONF-9106194-7) Avail: NTIS HC/MF A01

Pion production in relativistic heavy-ion collisions is examined. It is shown that the commonly employed effective-velocity theory is incorrect. A formulation based on the unitarity is presented. DOE

N92-12642# Los Alamos National Lab., NM.
NEUTRON BRILLOUIN SCATTERING IN A METALLIC GLASS
J. B. Suck, P. A. Egelstaff, R. A. Robinson, D. S. Sivia, and A. D. Taylor (Rutherford Appleton Lab., Chilton, England) 1991 12 p Presented at the 5th International Conference on the Structure of Non-Crystalline Materials, Sendai, Japan, 2-6 Sep. 1991
(Contract W-7405-eng-36)
(DE92-000219; LA-UR-91-2968; CONF-9109103-1) Avail: NTIS HC/MF A03

The dispersion of collective modes in a metallic glass (Mg70Zn30) measured earlier at the thermal neutron time-of-flight spectrometer IN4 of the HFR of the ILL could be extended towards lower momentum transfers down to the first pseudo-Brillouin zone for the first time. This extension to momentum transfer not accessible up to now was possible using the highly resolving time-of-flight spectrometer HET of the new spallation source ISIS. In the region of overlap the two parts of the dispersion determined with different samples of the same metallic glass on different instruments agree very well. Also the earlier discrepancies with the dispersion determined for this metallic glass from a computer simulation could be nearly eliminated due to a more recent and more complete investigations of this glass. DOE

N92-12643# Stanford Linear Accelerator Center, CA.
CONSTRAINTS PLACED ON THE HIGGS SECTOR FROM PRECISION ELECTROWEAK MEASUREMENTS
Tatsu Takeuchi Sep. 1991 19 p Presented at the 1991 Nagoya Spring School on Dynamical Symmetry Breaking, Nakatsugawa, Japan, 23-27 Apr. 1991
(Contract DE-AC03-76SF-00515)
(DE92-000236; SLAC-PUB-5619; CONF-9104299-1) Avail: NTIS HC/MF A03

In this lecture, I would like to investigate what precision electroweak measurements have to tell us about the Higgs sector. I will show that the radiative corrections to electroweak interaction observables coming from the Higgs sector can be summarized into three parameters S, T, and U. The precision measurements of the observables will constrain S and T. By comparing these constraints with the theoretically predicted values of S and T, we will be able to tell which Higgs sector theories are more viable than others. DOE

N92-12644# Los Alamos National Lab., NM.
THE RIDDLE OF HIGH-ENERGY BARYON NUMBER VIOLATION
M. P. Mattis Sep. 1991 45 p
(Contract W-7405-eng-36)
(DE92-000253; LA-UR-91-2926) Avail: NTIS HC/MF A03

The exciting possibility that anomalous baryon and lepton number violation might be observable at the next generation of supercolliders is suggested by an instanton calculation due to Ringwald and Espinosa. In these lectures, the current controversial status of these claims is discussed, and several new technologies designed to analyze this question are reviewed. These technologies should contribute more generally to our understanding of weakly-coupled field theories in the nonperturbative regime where both energies and multiplicities are very large. DOE

N92-12645# Los Alamos National Lab., NM.
P-d CAPTURE REACTIONS IN MUONIC MOLECULES
J. L. Friar 1991 10 p Presented at the 13th European Conference on Few-Body Problems in Physics, Elba, Italy, 9-14 Sep. 1991
(Contract W-7405-eng-36)
(DE92-000256; LA-UR-91-2922; CONF-9109122--2) Avail: NTIS HC/MF A02

Capture reactions for very low-energy n-d and p-d systems are calculated and compared with experiment, as are low-energy n-d and p-d scattering. We find excellent agreement for the n-d scattering lengths, but poor agreement for the p-d case, which we believe is a problem with the experimental extrapolation. The n-d radiative capture is sensitive to details of the meson-exchange currents, but reasonable models agree with the data. The latter models are in good agreement with experiment when extended to the p-d case. Our large quartet capture rate resolves a long-standing anomaly. The EO capture matrix element recently obtained from a reanalysis of internal conversion in muonic molecules is in excellent agreement with our predictions. This matrix element is very clean theoretically and provides the best test of the calculations. DOE

N92-12646# Los Alamos National Lab., NM.
STRANGENESS PRODUCTION AT 200 GeV/NUCLEON
B. V. Jacak 1991 9 p Presented at the Symposium on High Energy Nuclear Collisions and Quark Gluon Plasma, Kyoto, Japan, 6-8 Jun. 1991
(Contract W-7405-eng-36)
(DE92-000259; LA-UR-91-2891; CONF-9106274-3) Avail: NTIS HC/MF A02

Results from the HELIOS External Spectrometer on kaon production in 200 GeV/A S+W and p+W collisions are presented. The K/(pi) ratios are compared with measurements at lower bombarding energies and are found to agree remarkably well. Evidence for secondary production of K(sup +) by meson-baryon rescattering is reviewed. The target rapidity results are compared with neutral strange particle results at midrapidity. DOE

N92-12647# Argonne National Lab., IL.
SUPERDEFORMED NUCLEI
R. V. F. Janssens and Teng Lek Khoo 1991 43 p Presented at the International Joliot-Curie Summer School of Nuclear Physics, Maubuissen (France), 16-21 Sep. 1991

(Contract W-31-109-eng-38)
(DE92-000269; ANL/CP-72878; CONF-9109278-1) Avail: NTIS HC/MF A03

This paper reviews the most recent advances in the understanding of the physics of superdeformed nuclei from the point of view of the experimentalists. It covers among other subjects the following topics: (1) the discovery of a new region of superdeformed nuclei near A equals 190, (2) the surprising result of the occurrence of bands with identical transition energies in neighboring superdeformed nuclei near A equals 150 and A equals 190, (3) the importance of octupole degrees of freedom at large deformation, and (4) the properties associated with the feeding and the decay of superdeformed bands. The text presented hereafter will appear as a contribution to the Annual Review of Nuclear and Particle Science, Volume 41. DOE

N92-12648# Argonne National Lab., IL. High Energy Physics Div.
IDENTIFYING THE ORIGIN OF NEW GAUGE BOSONS AT THE SSC AND LHC
Joanne L. Hewett and Thomas G. Rizzo (Iowa State Univ. of Science and Technology, Ames.) Aug. 1991 4 p Presented at the Particles and Fields, Vancouver, British Columbia, 18-22 Aug. 1991
(Contracts W-31-109-eng-38; W-7405-eng-82)
(DE92-000290; ANL-HEP-CP-91-76; CONF-910881-11) Avail: NTIS HC/MF A01

The ability of an SCD-like detector to identify the origin of a new neutral gauge boson Z(sub 2), once it has been discovered at the SSC and/or LHC, (large Hadron Collider) is examined. DOE

N92-12649# Los Alamos National Lab., NM.
THERMAL GENERATION AND MOBILITY OF CHARGE CARRIERS IN COLLECTIVE PROTON TRANSPORT IN HYDROGEN-BONDED CHAINS
M. Peyrard, R. Boesch, and I. Kourakis (Dijon Univ., France) 1991 15 p Presented at the North Atlantic Treaty Organization (NATO) ARW Workshop on Computation of Transport Properties in the Dilute Gas Region, Porto Carras (Greece), 28-31 May 1991
(Contract W-7405-eng-36)
(DE92-000306; LA-UR-91-2882; CONF-9105115-1) Avail: NTIS HC/MF A03

The transport of protons in hydrogen-bonded systems is a long standing problem which has not yet obtained a satisfactorily theoretical description. Although this problem was examined first for ice, it is relevant in many systems and in particular in biology for the transport along proteins or for proton conductance across membranes, an essential process in cell life. The broad relevance makes the study of proton conduction very appealing. Since the original work of Bernal and Fowler on ice, the idea that the transport occurs through chains of hydrogen bonds has been well accepted. Such proton wires were invoked by Nagle and Morowitz for proton transport across membranes proteins and more recently across lipid bilayers. In this report, we assume the existence of such an hydrogen-bonded chain and discuss its consequences on the dynamics of the charge carriers. We show that this assumption leads naturally to the idea of soliton transport and we put a special emphasis on the role of the coupling between the protons and heavy ions motions. The model is presented. We show how the coupling affects strongly the dynamics of the charge carriers and we discuss the role it plays in the thermal generation of carriers. The work presented has been performed in 1986 and 87 with St. Pnevmatikos and N. Flyzanis and was then completed in collaboration with D. Hochstrasser and H. Buettner. Therefore the results presented in this part are not new but we think that they are appropriate in the context of this multidisciplinary workshop because they provide a rather complete example of the soliton picture for proton conduction. This paper discusses the thermal generation of the charge carriers when the coupling between the protons and heavy ions dynamics is taken into account. The results presented in this part are very recent and will deserve further analysis but they already show that the coupling can assist for the formation of the charge carriers. DOE

N92-12650# Brookhaven National Lab., Upton, NY.
A SEARCH FOR THE COHERENT PRODUCTION OF AXIONS IN THE MILLI eV RANGE
R. Cameron, A. C. Melissinos, Y. Semertzidis, G. Cantatore, C. Rizzo, P. Ruoso, E. Zavattini (Trieste Univ., Italy), H. Halama, and D. Lazarus 1991 4 p Presented at the Particles and Fields 1991, Vancouver (Canada), 18-22 Aug. 1991
(Contracts DE-AC02-76CH-00016; DE-AC02-76ER-03075)
(DE92-000439; BNL-46214; CONF-910881-16) Avail: NTIS HC/MF A01

Axions provide a natural explanation for the absence of CP violation in the strong interaction. As weakly interacting light particles they are also candidates for the much sought after dark matter allegedly responsible for our lack of understanding of galactic dynamics. Beam dump, particle decay and astrophysical measurements carried out over the past decade have failed to provide positive evidence for their existence over a wide range of masses and coupling strengths. This experiment attempts to produce and detect scalar and pseudoscalar particles coherently produced through the interaction of laser photons with the virtual photons of the magnetic fields of superconducting dipole magnets as manifested by small changes in the polarization state of the laser light. A limit on the coupling of the axion to 2 photons of g(sub a gamma gamma) less than 6.67 x 10(exp -7) GeV(exp -1) was achieved. DOE

N92-12651# Fermi National Accelerator Lab., Batavia, IL.
JET RATES FROM DEEP INELASTIC MUON SCATTERING IN THE W RANGE OF 15 TO 35 GeV
C. Salgado Aug. 1991 4 p Presented at the Particles and Fields 1991, Vancouver (Canada), 18-22 Aug. 1991
(Contract DE-AC02-76CH-03000)
(DE92-000470; FNAL/C-91/225; CONF-910881-14) Avail: NTIS HC/MF A01

Production rates of forward jets in deep inelastic muon scattering are studied using the JADE jet finding algorithm. The evolution of di-jet rates with W is compared to QCD first order predictions in the W range of 15 to 25 GeV. DOE

N92-12652# Fermi National Accelerator Lab., Batavia, IL.
TRACKING AND VERTEX FINDING WITH DRIFT CHAMBERS AND NEURAL NETWORKS
C. Lindsey Sep. 1991 16 p Presented at the Workshop on Neural Networks: From Biology To High Energy Physics, Isola d'Elba (Italy), 5-14 Jun. 1991
(Contract DE-AC02-76CH-03000)
(DE92-000472; FNAL/C-91/241; CONF-9106281-1) Avail: NTIS HC/MF A03

Finding tracks, track vertices and event vertices with neural networks from drift chamber signals is discussed. Simulated feed-forward neural networks have been trained with back-propagation to give track parameters using Monte Carlo simulated tracks in one case and actual experimental data in another. Effects on network performance of limited weight resolution, noise and drift chamber resolution are given. Possible implementations in hardware are discussed. DOE

N92-12653# Washington Univ., Saint Louis, MO.
STUDIES OF COMPLEX FRAGMENT EMISSION IN HEAVY ION REACTIONS
R. J. Charity and L. G. Sobotka Sep. 1991 32 p
(Contract DE-FG02-87ER-40316)
(DE92-000532; DOE/ER-40316/5) Avail: NTIS HC/MF A03

This report discusses the following topics: High energy photon production in a HI collision; the mechanism for the disassembly of excited O-16 projectiles into four alpha particles; the disassembly of excited Si-28 projectiles; large pre-fission multiplicities from temperature; dependent friction and fission barriers; multiplicity correlations; molecular beam induced fusion; dwarf ball and wall;

mini wall; and computer and local data acquisition systems. DOE

N92-12654# Washington Univ., Saint Louis, MO. Dept. of Chemistry.
INVESTIGATIONS OF NUCLEAR STRUCTURE AND NUCLEAR REACTIONS INDUCED BY COMPLEX PROJECTILES
D. G. Sarantites 1991 52 p
(Contract DE-FG02-88ER-40406)
(DE92-000533; DOE/ER-40406/4) Avail: NTIS HC/MF A04

The research program of our group touches five areas of nuclear physics: (1) Nuclear structure studies at high spin; (2) Studies at the interface between structure and reactions; (3) Production and study of hot nuclei; (4) Incomplete fusion and fragmentation reactions; and (5) Development and use of novel techniques and instrumentation in the above areas of research. The papers from these areas are discussed in this report. DOE

N92-12655# Fermi National Accelerator Lab., Batavia, IL.
SEARCH FOR NEW PARTICLES IN CDF
A. Laasanen (Purdue Univ., West Lafayette, IN.) Sep. 1991 4 p Presented at the Particles and Fields 1991, Vancouver (Canada), 18-22 Aug. 1991
(Contract DE-AC02-76CH-03000)
(DE92-000638; FNAL/C-91/234-E; CONF-910881-17) Avail: NTIS HC/MF A01

Preliminary results on searches for new particles beyond the Standard Model are presented. The data were taken by the Collider Detector at Fermilab (CDF) collaboration at the Fermilab (-p)p collider at a center of mass energy of 1.8 TeV. Limits on the masses of the gluino and squark in a minimal supersymmetric theory are given. The 90 percent confidence level asymptotic lower mass limits on each are 150 GeV/c(exp 2). A special data run was taken to search for the diffractively produced sextet quark state (eta)(sub 6). An (eta)(sub 6) with a mass larger than 20 GeV/c(exp 2) is excluded at the 95 percent confidence level. Limits are also set on the pair-production of massive stable charged particles. Unit-charged particles belonging to spin (1/2) color triplets with masses between 50 and 139 GeV/c(exp 2) are ruled out at the 95 percent confidence level as are charge 2/3 particles with masses between 50 and 116 GeV/c(exp 2) and charge 4/3 particles with masses between 50 and 140 GeV/c(exp 2). DOE

73 NUCLEAR AND HIGH-ENERGY PHYSICS

Includes elementary and nuclear particles; and reactor theory.

For space radiation see *93 Space Radiation.*

N92-12656# Oak Ridge National Lab., TN.
NUCLEAR POWER ENGINEERING IN SPACE
R. H. Cooper, Jr. 18 Jun. 1990 16 p
(Contract DE-AC05-84OR-21400)
(DE90-012743; ORNL/FTR-3640) Avail: NTIS HC/MF A03

The principal purpose of this trip was to participate in the Anniversary Specialist Conference on Nuclear Power Engineering in Space hosted by the USSR Ministry of Atomic Power Engineering and Industry. The conference was held in Obninsk, USSR. A secondary purpose of the trip was to meet with the French Commissariat A L'Energie Atomique in Paris regarding the status of their space power program. DOE

N92-12657# Edgerton, Germeshausen and Grier, Inc., Idaho Falls, ID.
MULTIMEGAWATT SPACE POWER REACTORS
J. A. Dearien and J. F. Whitbeck 1989 39 p Presented at the International Astronautics Federation (IAF) Conference on Space Power, Cleveland, 5-7 Jun. 1989
(Contract DE-AC07-76ID-01570)
(DE90-012965; EGG-M-89264; CONF-8906169-2) Avail: NTIS HC/MF A03

In response to the need of the Strategic Defense Initiative (SDI) and long range space exploration and extra-terrestrial basing by the National Air and Space Administration (NASA), concepts for nuclear power systems in the multi-megawatt levels are being designed and evaluated. The requirements for these power systems are being driven primarily by the need to minimize weight and maximize safety and reliability. This paper will discuss the present requirements for space based advanced power systems, technological issues associated with the development of these advanced nuclear power systems, and some of the concepts proposed for generating large amounts of power in space. DOE

N92-12658# Oak Ridge National Lab., TN.
EXPERIMENTAL RESULTS FROM STUDIES ON NUCLEUS-NUCLEUS COLLISIONS AT HIGH ENERGY
G. R. Young Jun. 1990 12 p Presented at the 15th General Meeting of the Div. of Particles and Fields of the American Physical Society, Houston, TX, 3-6 Jan. 1990
(Contract DE-AC05-84OR-21400)
(DE90-012286; CONF-900135-11) Avail: NTIS HC/MF A03

A short overview is presented of results from the initial accelerator-based studies of collisions of heavy nuclei at high energies. Some comments are made on the global observables studied and their implications for achieving conditions for deconfinement. Finally, information available from certain more specific probes selected for their ability to test whether a deconfined system of quarks and gluons is created in such collisions is presented. DOE

N92-12659# Brown Univ., Providence, RI. Dept. of Physics.
A RESEARCH PROGRAM IN EXPERIMENTAL HIGH ENERGY PHYSICS Progress Report
R. E. Lanou, Jr. and D. Cutts 1 Jul. 1990 47 p
(Contract DE-AC02-76ER-03130)
(DE90-013321; DOE/ER-03130/55; COO-3130TC-55) Avail: NTIS HC/MF A03

An experimental program in strong and electro-weak interaction physics of elementary particles is being carried out using electronic detection techniques. Experiments have been performed at Brown, Brookhaven, and Fermilab. The work described in this report by the Electronic Detector Group addresses the following: neutrino interactions and intrinsic properties, preparations for experiments (D-ZERO) at the FNAL 2 TeV antiproton-proton Collider, new detection techniques for neutrino properties. DOE

N92-12660# Brown Univ., Providence, RI. Dept. of Physics.
RESEARCH PROGRAM IN EXPERIMENTAL HIGH ENERGY PHYSICS, TASK B
M. Widgoff 1 Jul. 1990 62 p
(Contract DE-AC02-76ER-03130)
(DE90-013323; DOE/ER-03130/269) Avail: NTIS HC/MF A04

Two prototype tracking system modules of the LVD detector have been produced by the direct-mount method and tested. The direct-mount procedure was proposed by a subgroup (mainly US) of the LVD Collaboration. This method has the advantages over the previous (hood) design of greater signal-to-noise ratio, of providing spacing between the two streamer chamber layers of each tracking plane to improve track reconstruction and angular resolution, economy and speed of production. The tests have shown very satisfactory performance, both of the mechanical aspects and of the read-out electronic which are principally Brown's responsibility. The Collaboration has agreed to proceed with production by this method. The full boot node data acquisition computer and one tower microvax, both provided by the Brown group, have been installed Hall A of Gran Sasso, where data acquisition development will proceed. FNAL Experiment E782, a study of the interactions of muons from the Tevatron, using an upgraded version of the E745 hybrid system, is now running at Fermilab. During the past year, film analysis of the 1987 run of E745, a study of the interactions of muon neutrinos, was essentially completed and a data summary tape is being produced. Also during the past year, analysis has continued both on the data of our experiments on interactions of hadrons with protons and heavier

nuclei (FNAL E565, E570, E299, E154) and on the data of SLAC experiments BC72/73/75, studying the interactions in hydrogen of 20 GeV/c photons. DOE

N92-12661# Sandia National Labs., Albuquerque, NM.
FABRICATION AND ASSEMBLY OF BOLVAPS (BOIL-OFF LITHIUM VAPOR SOURCE) CERAMIC-OPTION HALF ANODES
R. H. Moore, D. B. Appel, J. S. Cap, S. H. Spiak, and B. P. J. Cason (General Electric Co., Largo, FL.) Jun. 1990 69 p
(Contract DE-AC04-76DP-00789)
(DE90-012012; SAND-89-0634) Avail: NTIS HC/MF A04

In order to generate a lithium vapor on the anode surface within PBFA II, an electrically insulating, lithium-coated substrate is required. One approach for providing this lithium source is the ceramic-option anode. This anode consists of two halves, equatorially split, each containing an insulating ceramic insert onto which a lithium-bearing film is sputtered. A lithium vapor is generated by ohmically pulse heating this film to 1500 K. The half-anode structure required to produce this vapor consists of a ceramic insulator, steel housing, and disk conductors. This report describes the design and fabrication of these separate components and the procedures required to join them to form the half-anode assembly. In addition, appendices are included which contain detailed drawings and specifications for these operations. DOE

N92-12662# Stanford Linear Accelerator Center, CA.
JAZELLE: AN ENHANCED DATA MANAGEMENT SYSTEM FOR HIGH ENERGY PHYSICS
A. S. Johnson, M. I. Breidenbach, H. Hissen, P. F. Kunz, D. J. Sherden, and T. Burnett (Washington Univ., Seattle.) Apr. 1990 10 p Presented at the Computing in High Energy Physics, Santa Fe, NM, 9-13 Apr. 1990
(Contracts DE-AC02-89ER-40509; DE-AC03-76SF-00515)
(DE90-013571; SU-SLAC-PUB-5231; CONF-9004190-15) Avail: NTIS HC/MF A02

The data management system JAZELLE has been created as a successor to earlier HEP data managers such as YBOS and ZEBRA. While it has many similarities with these systems it also has many enhancements such as self-documenting data descriptions, mnemonic access to all data, relational data structures, powerful machine independent IO facilities including network IO, and many mechanisms for presenting data to the physicist in an intuitive manner. The emphasis has been on producing a powerful, use friendly, data management system which can be accessed from many languages as a natural extension of these languages. Within the SLD collaboration JAZELLE has been used to manage the experimental data all the way from the SLD online VAX to the end to the reconstruction chain and physics analysis. Beyond this, JAZELLE is also used to store calibration constants and correction factors, detector geometry, physics parameters (such as particles masses and branching ratios) and program control parameters. JAZELLE has also been interfaced to the interactive data analysis program IDA. The uniform usage of JAZELLE throughout SLD coupled with its interface to IDA has produced an environment in which rapid interactive access to data is greatly simplified. JAZELLE and IDA together provide an analysis environment greatly superior to any standard programming language. DOE

N92-12663# European Organization for Nuclear Research, Geneva (Switzerland). European Committee for Future Accelerators.
LARGE HADRON COLLIDER WORKSHOP. VOLUME 2: PROCEEDINGS
G. Jarlskog, ed. and D. Rein, ed. 3 Dec. 1990 1307 p Workshop held in Aachen, Fed. Republic of Germany, 4-9 Oct. 1990
(DE91-634595; CERN-90-10(v-2)-Vol-2; CONF-9010291-Vol-2; ECFA-90-133(v-2)-Vol-2) Avail: NTIS HC/MF A99

The aim of the LHC workshop at Aachen was to discuss the discovery potential of a high-luminosity hadron collider (the Large Hadron Collider) and to define the requirements of the detectors. Of central interest was whether a Higgs particle with mass below 1 TeV could be seen using detectors potentially available within a few years. Other topics included supersymmetry, heavy quarks, excited gauge bosons, and exotica in proton-proton collisions, as well as physics to be observed in electron-proton and heavy-ion collisions. A large part of the workshop was devoted to the discussion of instrumental and detector concepts, including simulation, signal processing, data acquisition, tracking, calorimetry, lepton identification and radiation hardness. The workshop began with parallel sessions of working groups on physics and instrumentation and continued, in the second half, with plenary talks giving overviews of the LHC project and the SSC, RHIC, and HERA programs, summaries of the working groups, presentations from industry, and conclusions. Vol. 1 of these proceedings contains the papers presented at the plenary sessions, Vol. 2 the individual contributions to the physics sessions, and Vol. 3 those to the instrumentation sessions. DOE

N92-12664# Texas A&M Univ., College Station. Dept. of Physics.
NEW TECHNOLOGY FOR LINEAR COLLIDERS
P. M. McIntyre Aug. 1991 21 p
(Contract DE-FG02-91ER-40613)
(DE92-000081; DOE/ER-40613/1) Avail: NTIS HC/MF A03

The purpose of this contract is to develop and evaluate new technology for future e(+)e(-) linac colliders. TeV linac colliders will require major improvements in the performance of microwave power tubes: greater than 100 mW/m peak power, approximately 20 GHz frequency, and high frequency. For the past three years we have been developing gigatron, a new design concept for microwave power tubes. It incorporates three key innovations: a gated field-emitter cathode which produces a fully modulated electron beam directly into the vacuum; a ribbon beam geometry which eliminates space charge and phase dispersion; and a traveling wave coupler which provides optimum output coupling even over a wide ribbon beam. During the past year we have built prototypes of two cathode designs: a stripline edge-emitter array and a porous silicon dioxide cathode. A highlight of our results is the development and testing of the porous SiO2 cathode. It delivers exceptional performance as a modulated electron source in general and for gigatron in particular. Its high emitter density and low work function accommodate higher tube gain, simpler cathode coupling, and higher peak power than any other technology. The protection of the active emitting surface by approximately 2 microns of porous SiO2 should provide for rugged operation in a tube environment. DOE

N92-12665# Nationaal Inst. voor Kernfysica en Hoge Energiefysica, Amsterdam (Netherlands).
MANUAL FOR A PATTERN GENERATOR [HANDLEIDING PATROONGENERATOR]
Rob Leenheer 1991 26 p In DUTCH
(LINO-1991-2; ETN-91-90048) Avail: NTIS HC/MF A03

The principle and use of a pattern generation the real time power control of an RF station are described. This station is situated just behind the extraction line of an accelerator ring. The RF signal depends on the bundle. During injection, the power switches three times stepwise from zero to maximum. During extraction, the bundle power decreases smoothly. The pattern generator is driven by four voltage controlled phase shifters. For the first part of the trajectory (injection) two digital to analog converters (DAC) provide a constant voltage to the first phase shifter. The rest of the trajectory (from the end of the injection to the end of the cycle) is controlled by four programmable pattern generators Arbitrary Waveform Generators (AWFG). DAC's and AWFG's are contained in a Personal computer equipped with a user interface. The software for control and user interface are written in TURBO PASCAL. ESA

N92-12666# Lawrence Livermore National Lab., CA.
THULIUM HEAT SOURCE FOR HIGH-ENDURANCE AND HIGH-ENERGY DENSITY POWER SYSTEMS
C. E. Walter, J. E. Kammeraad, R. VanKonynenburg, and J. H. VanSant May 1991 10 p Presented at the 26th Intersociety Energy Conversion Engineering (IECE) Conference, Boston, MA,

3-9 Aug. 1991
(Contract W-7405-eng-48)
(DE91-018991; UCRL-JC-105761; CONF-910801-23) Avail: NTIS HC/MF A02

We are studying the performance characteristics of radioisotope heat source designs for high-endurance and high-energy-density power systems that use thulium-170. Heat sources in the power range of 5 to 50 kW(sub th) coupled with a power conversion efficiency of approximately 30 percent, can easily satisfy current missions for autonomous underwater vehicles. New naval missions will be possible because thulium isotope power systems have a factor of one-to-two hundred higher endurance and energy density than chemical and electrochemical systems. Thulium-170 also has several other attractive features, including the fact that it decays to stable ytterbium-170 with a half-life of four months. For terrestrial applications, refueling on that time scale should be acceptable in view of the advantage of its benign decay. The heat source designs we are studying account for the requirements of isotope production, shielding, and integration with power conversion components. These requirements are driven by environmental and safety considerations. Thulium is present in the form of thin refractory thulia disks that allow power conversion at high peak temperature. We give estimates of power system state points, performance, mass, and volume characteristics. Monte Carlo radiation analysis provides a detailed assessment of shield requirements and heat transfer under normal and distressed conditions is also considered. DOE

N92-12667# Los Alamos National Lab., NM.
DEVELOPMENTS AND DIRECTIONS IN 200 MHz VERY HIGH POWER RF AT LAMPF
R. Cliff, E. D. Bush, R. A. DeHaven, H. W. Harris, and M. Parsons 1991 33 p Presented at the RF Expo 1991, Orlando, FL, 29 Oct. 1991
(Contract W-7405-eng-36)
(DE92-000175; LA-UR-91-3102; CONF-9110221-1) Avail: NTIS HC/MF A03

The Los Alamos Meson Physics Facility (LAMPF), is a linear particle accelerator a half-mile long. It produces an 800 million electron-volt hydrogen-ion beam at an average current of more than one milliamp. The first RF section of the accelerator consists of four Alvarez drift-tube structures. Each of these structures is excited by an amplifier module at a frequency of 201.25 MHz. These amplifiers operate at a duty of 13 percent or more and at peak pulsed power levels of about 2.5 million watts. The second RF accelerator section consists of forty-four side-coupled-cavity structures. Each of these is excited by an amplifier module at a frequency of 805 MHz. These amplifiers operate at a duty of up to 12 percent and at peak pulsed power levels of about 1.2 million watts. The relatively high average beam current in the accelerator places a heavy demand upon components in the RF systems. The 201-MHz modules have always required a large share of maintenance efforts. In recent years, the four 201.25 MHz modules have been responsible for more than twice as much accelerator down-time as have the forty-four 805 MHz modules. This paper reviews recent, ongoing, and planned improvements in the 201-MHz systems. The Burle Industries 7835 super power triode is used in the final power amplifiers of each of the 201-MHz modules. This tube has been modified for operation at LAMPF by the addition of Penning ion vacuum pumps. This has enabled more effective tube conditioning and restarting. A calorimetry system of high accuracy is in development to monitor tube plate-power dissipation. DOE

N92-12668# Superconducting Super Collider Lab., Dallas, TX.
FIRST ORDER TUNE SHIFT CALCULATIONS FOR TRANSVERSE BETATRON DYNAMICS
T. Garavaglia Sep. 1991 36 p Presented at the 1991 Symposium on the Superconducting Super Collider (SSC), Corpus Christi, TX, 13-17 Oct. 1991
(Contract DE-AC35-89ER-40486)
(DE92-000370; SSCL-507; CONF-9110225-1) Avail: NTIS HC/MF A03

An effective Hamiltonian, with non-linear magnetic multipole terms and momentum dispersion contributions, is used to obtain the first order tune-shift results for transverse betatron motion for protons in the Superconducting Super Collider (SSC). This Hamiltonian is represented in terms of action angle variables, and analytical results are obtained using symbolic algebra methods. Mathematical derivations of the transverse multipole expansion and of the transverse betatron equations, using an invariant action and curvilinear coordinates, are given in the appendices. Numerical and graphical tune-space results are given that illustrate the dependence of tune-shifts on injection amplitude and momentum spread. DOE

N92-12669# California Univ., Berkeley. Lawrence Berkeley Lab.
AN UPDATE ON PASSIVE CORRECTORS FOR THE SSC DIPOLE MAGNETS
M. A. Green May 1991 57 p
(Contract DE-AC03-76SF-00098)
(DE92-000649; LBL-30766; SC-MAG-337) Avail: NTIS HC/MF A04

The concept of correction of the magnetization sextupole became a topic of discussion as soon as it was realized that superconductor magnetization could have a serious effect on the SSC beam during injection. Several methods of correction were proposed. These included (1) correction with active bore tube windings like those on the HERA machine which correct out magnetization sextupole and the sextupole due to iron saturation, (2) correction with persistent sextupole windings mounted on the bore tube, (3) correction using passive superconductor, (4) correction using ferromagnetic material, and (5) correction using oriented magnetized materials. This report deals with the use of a passive superconductor to correct the magnetization sextupole. Two basic methods are explored in this report: (1) One can correct the magnetization sextupole by changing the diameter of the superconductor filaments in one or more blocks of the SSC dipole. (2) One can correct the magnetization sextupole and decapole by mounting passive superconducting wires on the inside of the SSC dipole coil bore. In addition, an assessment of the contribution of each conductor in the dipole to the magnetization sextupole and decapole is shown. DOE

N92-12670# California Univ., Berkeley. Lawrence Berkeley Lab.
MAGNETIC FIELD IN THE SSC ARC QUAD
S. Caspi, M. Helm, and L. J. Laslett 29 Apr. 1991 44 p
(Contract DE-AC03-76SF-00098)
(DE92-000656; LBL-30668; SC-MAG-336) Avail: NTIS HC/MF A03

In part one we report on field calculations along the conductor in the end region of the SSC arc-quad. We have determined that the maximum field in the 2D section is 5.04 tesla located at the pole turn of the inner layer somewhere in the middle of the cable (strand 9)(fields are at 6500 A). At the end the maximum field is slightly higher 5.09 tesla located at the overpass (strand 11). The iron contribution was included assuming infinite permeability. In part two we include results of a 3D representation of the magnetic field inside the bore. The complete analysis, for which a brief description has been included here, is described elsewhere. This form for presenting the field is suitable for interfacing with other codes that make use of the 3D field components (particle tracking and stability). DOE

74 OPTICS

Includes light phenomena; and optical devices.
For lasers see *36 Lasers and Masers.*

N92-12671# Lawrence Livermore National Lab., CA.
STIMULATED RAMAN SCATTERING IN OPTICAL FIBERS: POLYCHROMATIC SINGLE-FIELD NUMERICAL EXPERIMENTS
R. J. Hawkins and R. H. Stolen (Bell Telephone Labs., Inc., Holmdel,

NJ.) 29 Nov. 1989 5 p Presented at the IEEE/LEOS/OSA Topical Meeting on Integrated Photonics Research, Hilton Head Island, 26-28 Mar. 1990
(Contract W-7405-eng-48)
(DE90-012894; UCRL-102094; CONF-900328-2) Avail: NTIS HC/MF A01

We show that the response-function based computational approach to Raman scattering predicts accurately many of the propagation properties of picosecond pulses in single-mode optical fibers. DOE

N92-12672# Lawrence Livermore National Lab., CA.
LASER CONDITIONING OF OPTICAL THIN FILMS
C. R. Wolfe, M. R. Kozlowski, J. H. Campbell, F. Rainer, A. J. Morgan, and R. P. Gonzales May 1989 19 p Presented at the 1989 Boulder Damage Symposium, Boulder, CO, 1-3 Nov. 1989
(Contract W-7405-eng-48)
(DE90-013483; UCRL-101641; CONF-8911192-3) Avail: NTIS HC/MF A03

Results are presented that show the damage thresholds of e-beam deposited multi-layer HfO2/SiO2 thin films can be permanently increased by a factor of 2 to 3 by illumination with subthreshold fluences of laser light. This subthreshold illumination procedure is referred to as laser conditioning. The films used in this study were prepared by three different physical-vapor-deposition techniques: ion-beam sputtering, plasma plating, and e-beam evaporation. Only the e-beam deposited films showed consistent and significant improvement with laser conditioning. Of the material pairs examined (HfO2/SiO2, ZrO2/SiO2, and TiO2/SiO2), HfO2/SiO2 gave the greatest and most consistent damage improvement with conditioning. The number of layers and the reflective or transmissive characteristics of the HfO2/SiO2 films were found to have little impact on laser conditioning of the film. The results show that the damage thresholds of a wide range of e-beam deposited coatings (e.g., HR's, polarizers, etc.) can be improved by laser conditioning. Several possible conditioning mechanisms are examined. DOE

N92-12673# Argonne National Lab., IL. Advanced Photon Source Div.
WORKSHOP ON HIGH HEAT LOAD X RAY OPTICS
Jan. 1990 528 p Workshop held in Argonne, Il, 3-5 Aug. 1989
(Contract W-31-109-eng-38)
(DE90-011799; ANL/APS-TM-6; CONF-890874) Avail: NTIS HC/MF A23

A workshop on High Heat Load X-Ray Optics was held at Argonne National Laboratory on August 3-5, 1989. The object of this workshop was to discuss recent advances in the art of cooling x-ray optics subject to high heat loads from synchrotron beams. The cooling of the first optical element in the intense photon beams that will be produced in the next generation of synchrotron sources is recognized as one of the major challenges that must be faced before one will be able to use these very intense beams in future synchrotron experiments. Considerable advances have been made in this art during the last few years, but much work remains to be done before the heating problem can be said to be completely solved. Special emphasis was placed on recent cooling experiments and detailed finite element and finite difference calculations comparing experiment with theory and extending theory to optimize performance. DOE

N92-12674# Lawrence Livermore National Lab., CA.
LARGE AREA LASER CONDITIONING OF DIELECTRIC THIN FILM MIRRORS
M. R. Kozlowski, C. R. Wolfe, M. C. Staggs, and J. H. Campbell 30 May 1990 19 p Presented at the Boulder Damage Symposium, Boulder, CO, 1-3 Nov. 1989
(Contract W-7405-eng-48)
(DE90-013485; UCRL-101643; CONF-8911192-4) Avail: NTIS HC/MF A03

The laser conditioning of dielectric thin film HR coatings has been studied as a practical method for the improvement of the damage thresholds of large area (1.1 m dia.) high power 1064 nm laser mirrors on the LLNL 120kJ, 100TW Nova laser system. Both HfO2/SiO2 and /ZrO2/SiO2 HR coatings were conditioned by rastering with a small (approximately 0.2 mm) diameter beam from a pulsed (18 Hz, 8 ns) Nd-YAG laser (1064 nm). The samples were rastered at various fluences below the unconditioned damage threshold and subsequently damage tested. Large area conditioning studies were also performed using a large aperture beam of the Nova laser. The laser conditioning effect was found to be permanent. Improvements in damage threshold due to conditioning were as high as a factor of 2.7 and were dependent on the conditioning parameters. A model for the conditioning effect is proposed based on emptying of electronic defect levels within. DOE

N92-12675# Norwegian Defence Research Establishment, Kjeller.
ANOMALOUS DISPERSION IN GASES DERIVED FROM THE OPTICAL DEPTH. THEORETICAL TREATMENT: LINE BY LINE CALCULATIONS
Egil Bingen and Bjornar Ystad Jun. 1991 57 p
(NDRE/Publ-91/1002; ISSN-0800-4412) Avail: NTIS HC/MF A04

Described here is the theoretical development of the anomalous dispersion in a mixture of gases from an optical depth. The dispersion is determined by a Hilbert transform of the optical depth. An optical depth formulation as defined by Van Vleck and Huber is fundamental to this treatment. The Hilbert transform is performed without approximations, giving an expression for the dispersion which is valid for all wavenumbers subject to the validity of the dipole approximation and a classical description of the electromagnetic field. The derived expression is adequate for the Voigt, Lorentz, and Doppler line shape functions. The effect of line coupling is not taken into account. An approximate expression for the dispersion is implemented for line by line calculations of dispersion in a modified FASCOD2. This approximation os valid when homogeneous (Lorentz) broadning is dominant and the resonance wave number is greater than 1cm(-1) (30 GHz). Author

N92-12676# ERG Systems, Inc., Saint James, NY.
FULL SURFACE TESTING OF GRAZING INCIDENCE MIRRORS Quarterly Annual Report No. 4
John L. Remo 9 Sep. 1991 62 p
(Contract N00014-90-C-0246)
(AD-A240356) Avail: NTIS HC/MF A04 CSCL 20/6

The following goals were accomplished during the first year of the Phase 2 work plan for the Full Surface Testing of Grazing Incidence Mirrors (FSIS): FSIS prototype design; Procurement and testing of components; Mathematic and algorithm development; Interferogram data reduction algorithms; Construction of the first prototype (optical head); and Automated operation software design and development. Therefore, work will begin on the following second year goals: Upgrade and modification of the optical head; Integration of the automated hardware controls and software; and Testing the FSIS on optical surfaces. GRA

N92-12677 Department of the Navy, Washington, DC.
INFRARED IMAGE DETECTOR UTILIZING SCHOTTKY BARRIER JUNCTIONS Patent
Tak-Kin Chu, inventor (to Navy) 9 Oct. 1990 7 p Filed 27 Jun. 1989
(AD-D014976; US-Patent-4,962,303; US-Patent-Appl-SN-371884; US-Patent-Class-250-208.1) Avail: US Patent and Trademark Office CSCL 17/5

An infrared image detector array is constructed by depositing a plurality of non-contiguous strips of infrared radiation responsive, semiconductor material on one side of a base substrate. A contiguous metal semiconductor contact is then overlaid on the plurality of strips thereby forming an individual Schottky barrier detector element wherever the metal contact crosses one of the plurality of strips. GRA

N92-12678# McGill Univ., Montreal (Quebec). Dept. of Electrical Engineering.
ANALYSIS OF CLADDED UNIAXIAL SINGLE CRYSTAL FIBERS
J. D. Dai and C. K. Jen (National Research Council of Canada, Boucherville, Quebec) 1990 17 p Sponsored in part by Natural Sciences and Engineering Council of Canada
(NRC-32596; NRC-IMI90AP-11001-1056-G; CTN-91-60250)
Avail: NTIS HC/MF A03

Integrated optics (IO) devices have become an essential part of the telecommunication industry as signal processing devices and are finding new applications in other areas such as sensors. Recently single crystal fibers are emerging as an attractive component in the area of optical second harmonic generation and fiber lasers due to their long length, small diameter, light weight and high mechanical flexibility. It is expected that single crystal cladded fibers (SCCFs) consisting of both core and cladding regions can be used as key IO components, especially since they can be easily integrated with fiber optic systems. In this article a complete analysis for a uniaxial core uniaxial cladding step-index fiber is presented. Numerical results of a few lowest order modes are presented for weakly guiding LiNbO3 single crystal cladded fibers. It was found that the fundamental mode in a uniaxial fiber is not linearly polarized (LP) but has significant orthogonal components even though the fiber is under weak guidance and has no birefringence. It is concluded that the large anisotropy can cause the invalidity of the linear polarization approximation in a uniaxial fiber, but birefringence are not necessarily involved. The electrical lines of the fundamental modes for a uniaxial fiber are also considerably different from those of an isotropic one but eigenvalues and fractions of power in the core are very similar.
Author (CISTI)

N92-12679# National Research Council of Canada, Boucherville (Quebec). Industrial Materials Research Inst.
BACKWARD COLLINEAR ACOUSTO-OPTIC INTERACTIONS IN BULK MATERIALS
J. E. B. Oliveira (Instituto Tecnologico de Aeronautica, Sao Paulo, Brazil) and C. K. Jen 1988 16 p Sponsored in part by Natural Science and Engineering Research Council
(NRC-29095; CTN-91-60299) Copyright Avail: NTIS HC/MF A03

Theoretical studies of backward collinear acousto-optic interactions (BCAOI) in both isotropic and anisotropic materials are presented. As a result of the recent advent of efficient high frequency piezoelectric transducers BCAOI has become very attractive for devices applications. Furthermore BCAOI can also exist in a fiber waveguide. BCAOI configurations, which involve logitudinal acoustic waves in fused silica, germanium and several uniaxial single crystals, are analyzed. The acoustic propagation loss at high frequency in these materials are discussed. The merits of BCAOI can be summerized as follows. There is no forbidden interaction direction in any isotropic, uniaxial or biaxial material having low acoustic and optical loss. Incident light with ordinary or extraordinary polarization may be coupled into diffracted light with ordinary, extraordinary or both polarizations by proper choices of crystal orientations. By a proper choice of crystal orientations there may exist a very small gap between the loci of the ordinary and the extraordinary optical waves. It means that within the bandwidth of the acoustic transducer the diffracted light can be controlled to have ordinary or extraordinary polarizations by changing the acoustic frequency. CISTI

N92-12680# Technische Hochschule, Darmstadt (Germany, F.R.). Fachbereich Physik.
NONLINEAR DYNAMICS OF OPTICAL RING RESONATORS Ph.D. Thesis [NICHTLINEARE DYNAMIK OPTISCHER RINGRESONATOREN]
Dietrich Merkle 1990 112 p In GERMAN
(ETN-91-90173) Avail: NTIS HC/MF A06

A theoretical model containing the fundamental physical mechanisms is presented. The dynamics of single ring resonator are examined with a system of difference differential equations. The crucial control parameter is the recovery time, e.g., the time of a revolution of light in the resonator. Numerical integration of motion equations are used to examine the dynamics in the vicinity of the instabilities of stationary states, and for greater recovery times, by which bifurcations and chaos are occurring. Diffraction terms complete the fundamental equations. The relevance of the most important results is evaluated, with regard to physical and nonlinear dynamic viewpoints. ESA

N92-12681# Aerospatiale, Cannes (France). Space and Strategic Systems Div.
ISO OPTICAL SUBSYSTEM
Christian Singer, Jean Alain Massoni, Bernhardt Mossbacher, and Ciro Cinotti (European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk, Netherlands) 1991 12 p
(Rept-911-440-115; ETN-91-90275) Avail: NTIS HC/MF A03

The Infrared Space Observatory (ISO) is an astronomical satellite operating at wavelengths from 2.5 to 200 microns. It will be launched in 1993. The ISO optical subsystem is a cryogenically cooled telescope with a baffling system (main baffle and sunshade). The main requirements of this telescope, a Ritchey-Chretian type, are given together with a design description. The optical analyses, which involve the image quality, the telescope/scientific alignments and straylight are discussed. The telescope structural and thermal analyses are considered. Results of analyses and tests performed on the telescope qualification model already tested and integrated inside the PLM are given. The baffling system with its main baffle and sunshade are also described. ESA

N92-12682 National Physical Lab., Teddington (England). Div. of Electrical Science.
THE FAR INFRARED OPTICAL CONSTANTS OF SOME COMMON POLYMERS
J. R. Birch Jun. 1991 41 p
(NPL-DES-111; ISSN-0143-7305; ETN-91-90297) Copyright
Avail: National Physical Lab., Teddington, TW11 0LW, England

The optical constants of six common polymers, high and low density polyethylene, TPX, polypropylene, Polytetra fluoroethylene (PTFE) and polystyrene, were determined in the spectral region between 50 and 500/cm at a temperature of 290 K. The measurements were made by the method of dispersive Fourier transform spectroscopy. The results of these studies are presented in both graphical and tabular form for ease of access. ESA

N92-12683# Sandia National Labs., Albuquerque, NM.
MOLECULAR TO MATERIAL DESIGN FOR ANOMALOUS-DISPERSION PHASE-MATCHED SECOND HARMONIC GENERATION
P. A. Cahill, D. R. Tallant, T. C. Kowalcyzk, and K. D. Singer (Case Western Reserve Univ., Cleveland, OH.) 1991 10 p Presented at the Society of Photo-Optical Instrumentation Engineers (SPIE) Meeting, San Diego, CA, 21-26 Jul. 1991
(Contract DE-AC04-76DP-00789)
(DE91-017999; SAND-91-1551C; CONF-9107115-43) Avail: NTIS HC/MF A02

Anomalous dispersion phase matching (ADPM) offers large enhancements in the effective hyperpolarizabilities of nonlinear optical processes such as second harmonic generation (SHG) in organic materials. The principal barrier to the practical application of this approach is the residual absorption of asymmetric organic chromophores at the second harmonic which is shown by calculation to inherently limit the efficiency of SHG. Resonance Raman experiments on a nonlinear optical (NLO) dye optimized for doubling 800 nm light indicate that the residual absorbance is probably due to vibronic levels associated with the electronic absorption. Recent work with the films of PMMA doped with this ADPM dye showed zero dispersion at approx. 6 pct. concentration. DOE

N92-12684# Lawrence Livermore National Lab., CA.
FAST OPTICALLY SENSITIVE SEGMENTED ARRAY (FOSSA)
31 Jan. 1991 116 p Prepared in cooperation with Eastman

Kodak Co., Rochester, NY
(Contract W-7405-eng-48)
(DE91-018997; UCRL-CR-107134) Avail: NTIS HC/MF A06

R1 image sensors were designed, fabricated, and partially tested. Most testing of the image area was precluded due to a clocking problem with the vertical charge coupled devices (CCDs). The probable cause of this clocking problem was due to inadequate contact to the p-well regions inside the image area. Since this time, we have successfully operated devices with the same readout architecture fabricated using a similar process. However, many of the other device design goals were met for this program. The photodiodes, antiblooming structure, and horizontal shift registers were seen to be functional. DOE

N92-12685# Sandia National Labs., Albuquerque, NM.
DESIGN AND TESTING OF 3-LEVEL OPTIMAL CORRELATION FILTERS
C. Hendrix, B. V. K. VijayaKumar (Carnegie-Mellon Univ., Pittsburgh, PA.), K. T. Stalker, B. A. Kast, and R. Shori 1991 12 p Presented at the Society of Photo-Optical Instrumentation Engineers (SPIE) Meeting, San Diego, CA, 21-26 Jul. 1991
(Contract DE-AC04-76DP-00789)
(DE91-019059; SAND-91-2047C; CONF-9107115-49) Avail: NTIS HC/MF A03

Previously, we have designed 3-level filters (suitable for implementation on magneto-optic spatial light modulators) to maximize the output signal-to-noise ratio (SNR) and to separately maximize Peak-to-Correlation Energy (PCE) that measures the correlation peak sharpness. In practice, we want the correlation peaks to be sharp (i.e., large PCE) as well as noise-tolerant (i.e., large SNR). In this paper, we will present a new method to optimally combine these two desirable properties into a single optimization procedure. Similar methods to trade off SRN versus Peak Efficiency and PCE versus Peak Efficiency will be presented. Both simulation and experimental results will be included. DOE

N92-12686# Wisconsin Univ., Madison. Space Science and Engineering Center.
DEVELOPMENT OF HIGH SPECTRAL RESOLUTION LIDAR TECHNOLOGY
E. W. Eloranta 30 Jul. 1991 5 p
(Contract DE-FG02-90ER-61058)
(DE92-000080; DOE/ER-61058/1) Avail: NTIS HC/MF A01

The first year of this grant has been devoted to the design and construction of an upgraded version of the University of Wisconsin High Spectral Resolution Lidar (HSRL). The new system incorporates additional data channels to measure depolarization and multiple scattering in the lidar return. Schematic diagrams describing the new configurations are attached to this report. Increases in optical efficiency and receiver aperture, coupled with improvements in the stiffness and the thermal stability of the mechanical system are expected to significantly improve the performance of the instrument. Most components of the system are nearly completed and system integration is about to begin. The HSRL is committed to participate in the NASA FIRE cirrus experiment during November and December of this year. Our progress is completing HSRL subsystems is outlined in the following paragraphs. DOE

N92-12687# Lawrence Livermore National Lab., CA.
EFFECTS OF OXIDE LAYERS ON OPTICAL PROPERTIES AND X RAY HARDNESS OF Al-Be MIRRORS
R. H. White and G. R. Wirtenson 11 Jun. 1991 12 p
(Contract W-7405-eng-48)
(DE92-000476; UCRL-ID-107225) Avail: NTIS HC/MF A03

Oxide layers form on the surfaces of many metallic mirrors. The oxidation may occur during fabrication or after the mirror is finished and installed. Some oxide layers may be intentionally added to protect the mirror or to change its optical properties. Computer calculations predict the effect of oxide layers on optical and ultraviolet reflectance as well as the x-ray absorption and concomitant thermal damage to the mirrors. DOE

75 PLASMA PHYSICS

Includes magnetohydrodynamics and plasma fusion.

For ionospheric plasmas see *46 Geophysics*. For space plasmas see *90 Astrophysics*.

N92-12688# Oak Ridge National Lab., TN.
ATOMIC AND MOLECULAR DATA FOR METALLIC IMPURITIES IN FUSION PLASMAS
D. C. Gregory Jun. 1990 13 p
(Contract DE-AC05-84OR-21400)
(DE90-012213; ORNL/FTR-3624) Avail: NTIS HC/MF A03

Representatives from electron-impact and ion-atom research groups reviewed and rated the available data on collision processes, of interest to fusion, involving impurity metals. The best available data were identified and rated for accuracy. Gaps and needs for additional experiments and calculations were noted. Summary articles with the group conclusions and recommendations will be published in a special topical issue of Physica Scripta along with articles on specific related topics by members of the Advisory Group. Laboratories at University College, London, were visited in order to renew contact with the research group there, which is one of the three most active in the United Kingdom in electron collision experiments. DOE

N92-12689# Tennessee Univ., Tullahoma. Space Inst.
PRIORITY POLLUTANT ANALYSIS OF MHD-DERIVED COMBUSTION PRODUCTS
Katherine D. Parks 1990 10 p Presented at the 28th Symposium on Engineering Aspects of Magnetohydrodynamics, Chicago, IL, 26-28 Jun. 1990
(Contract DE-AC02-79ET-10815)
(DE90-012630; DOE/ET-10815/147; CONF-9006105-4) Avail: NTIS HC/MF A02

An important factor in developing Magnetohydrodynamics (MHD) for commercial applications is environmental impact. Consequently, an effort was initiated to identify and quantify any possible undesirable minute chemical constituents in MHD waste streams, with special emphasis on the priority pollutant species. This paper discusses how priority pollutant analyses were used to accomplish the following goals at the University of Tennessee Space Institute (UTSI): comparison of the composition of solid combustion products collected from various locations along a prototypical MHD flow train during the firing of Illinois No. 6 and Montana Rosebud coals; comparison of solid waste products generated from MHD and conventional power plant technologies; and identification of a suitable disposal option for various MHD derived combustion products. Results from our ongoing research plans for gas phase sampling and analysis of priority pollutant volatiles, semi-volatiles, and metals are discussed. DOE

N92-12690# Lawrence Livermore National Lab., CA.
PHYSICS STUDY OF THE APPLICATION OF AN IFEL (INDUCTION FREE ELECTRON LASER) TO CIT (COMPACT IGNITION TOKAMAK)
E. B. Hooper, ed. 22 May 1990 21 p
(Contract W-7405-eng-48)
(DE90-011276; UCRL-ID-104103) Avail: NTIS HC/MF A03

The ECH system requirements on CIT might be met by microwaves generated by an induction free electron laser (IFEL). Design studies have assumed that the system is windowless, thus eliminating one of the most highly stressed components of the ECH system. The tradeoff for this advantage is that the IFEL is exposed to tritium diffusing from CIT. As reported in the attached appendix, we have investigated the use of cryopumping to control the tritium diffusion to the IFEL. With one to three pumping stations (depending on size) we can reduce the level of tritium in the IFEL to a level that may not pose a breathing hazard after one year of operation. In addition, adding pumping may allow hands-on maintenance after one year. Preliminary indications are that likely accident scenarios will occur slowly enough to permit valves to be closed before the IFEL is significantly contaminated. DOE

N92-12691# California Univ., Davis.
MEASUREMENTS OF LASER WAVELENGTH SCALING ION ACOUSTIC DECAY INSTABILITY AND ASSOCIATED EFFECTS IN LASER-PLASMA INTERACTION EXPERIMENTS
K. Mizuno, J. S. DeGroot, and W. Seka (Rochester Univ., NY.) Jun. 1989 21 p
(Contract DE-AS03-88DP-10779)
(DE90-011434; DOE/DP-10779/T1) Avail: NTIS HC/MF A03

We have made extensive studies of Ion Acoustic Decay Instabilities (IADI) in laser-pellet interactions under the program of the National Laser User Facility at LLE. We have observed well defined IADI. In this paper it is shown that IADI is potentially important in laser fusion applications. The threshold decreased as the laser spot size increased. The measured threshold is an order of magnitude lower that previously reported values in small spot experiments. The threshold values for IR and short wavelength Green lasers are quite low, and reached homogeneous-plasma collisional values in a planar plasma produced by a large spot size laser irradiations. The results are explained in agreement with LASNEX calculations with a flux limit of f = 0.1. These low threshold values indicate that IADI is potentially important in a large scale plasma, and even in short-wavelength laser-pellet interactions which are applicable to laser fusion research. It is shown that IADI is a useful tool for plasma diagnostic near the critical surface. We have shown that ion charge state Z can be measured using IADI signals. These measurements are possible without resorting to any complicated atomic physics model. At high intensity regimes, IADI spectrum is quite different from the medium intensity regime. A broad turbulent-like spectrum is observed. DOE

N92-12692# Oak Ridge National Lab., TN.
EFFECT OF THE EQUILIBRIUM MAGNETIC FIELD ON PLASMA EDGE FLUCTUATIONS
B. A. Carreras, J. N. Leboeuf, D. K. Lee, J. A. Holmes, and V. E. Lynch 1990 10 p Presented at the Topical Conference on Research Trends in Nonlinear and Relativistic Effects in Plasmas, San Diego, CA, 5-8 Feb. 1990
(Contract DE-AC05-84OR-21400)
(DE90-012720; CONF-900264-7) Avail: NTIS HC/MF A02

The magnetic field structure reflected in the safety factor (q) profile can play an important role in defining some of the basic structures of the magnetohydrodynamic (MHD) turbulence: it plays a role in the generation of spatial structures in the initial nonlinear phase, and it gives a radial dependence to the spectral average of the square of the poloidal mode number, (m exp 2)exp 1/2, that can modify the explicit dependences of an analytically derived expression for turbulence-induced anomalous losses. DOE

N92-12693# New York Univ., New York. Magneto-Fluid Dynamics Div.
PLASMA PROPERTIES
H. Weitzner Jun. 1990 35 p
(Contract DE-FG02-86ER-53223)
(DE90-012865; DOE/ER-53223/130) Avail: NTIS HC/MF A03

This paper discusses the following topics: MHD plasma activity-equilibrium, stability, and transport; statistical analysis; transport studies; edge physics studies; wave propagation analysis; basic plasma physics and fluid dynamics; space plasma; and numerical methods. DOE

N92-12694# Lawrence Livermore National Lab., CA.
MTX (MICROWAVE TOKAMAK EXPERIMENT) DATA ACQUISITION AND ANALYSIS COMPUTER NETWORK
D. N. Butner, T. A. Casper, M. D. Brown, M. Drlik, W. H. Meyer, and J. M. Moller Jun. 1990 14 p Presented at the 8th Topical Conference on High-Temperature Plasma Diagnostics, Hyannis, 6-10 May 1990 Revised
(Contract W-7405-eng-48)
(DE90-013066; UCRL-JC-103311-Rev-1; CONF-900557-12)
Avail: NTIS HC/MF A03

For the MTX experiment, we use a network of computers for plasma diagnostic data acquisition and analysis. This multivendor network employs VMS, UNIX, and BASIC based computers connected in a local area Ethernet network. Some of the data is acquired directly into a VAX/VMS computer cluster over a fiber-optic serial CAMAC highway. Several HP-Unix workstations and HP-BASIC instrument control computers acquire and analyze data for the more data intensive or specialized diagnostics. The VAX/VMS system is used for global analysis of the data and serves as the central data archiving and retrieval manager. Shot synchronization and control of data flow are implemented by task-to-task message passing using our interprocess communication system. The system has been in operation during our initial MTX tokamak and FEL experiments; it has operated reliably with data rates typically in the range of 5 megabytes/shot without limiting the experimental shot rate. DOE

N92-12695# Lawrence Livermore National Lab., CA.
MTX (MICROWAVE TOKAMAK EXPERIMENT) DIAGNOSTICS AND TIMING SYSTEM FOR FEL (FREE ELECTRON LASER) HEATING EXPERIMENTS
T. A. Casper, S. Allen, J. Foote, M. Fenstermacher, E. Hooper, C. Lasnier, W. H. Meyer, J. M. Moller, D. Nilson, and B. Rice et al 1990 14 p Presented at the 8th Topical Conference on High-Temperature Plasma Diagnostics, Hyannis, 6-10 May 1990 Revised
(Contract W-7405-eng-48)
(DE90-013067; UCRL-JC-103314-Rev-1; CONF-900557-11)
Avail: NTIS HC/MF A03

In the MTX program, we are concentrating on experiments using intense, FEL-generated microwave pulses. In initial FEL experiments, several diagnostic instruments were operated during injection of microwave pulses with peak powers to 0.2 GW at durations of 10 nsec. Fixed and spatially scanning microwave detectors and receivers and a 48-element calorimeter on the inside wall of MTX diagnosed the GW-level FEL microwave pulses to study linear wave absorption and to determine efficiencies of transmission through the quasi-optical transport system. In addition, several radially resolved measurements of plasma density, temperature, and emission were made during FEL injection and used in the analysis of microwave absorption data. A timing system, slaved to the FEL pulse arrival time is capable of accuracy to a few nanoseconds in order to allow measurement of heating effects on the time scale of a single FEL pulse. We will discuss operation of these diagnostics and our plans for future measurements of single pulse and high average power heating experiments. DOE

N92-12696# Schafer (W. J.) Associates, Inc., Chelmsford, MA.
A PLAN FOR THE STUDY OF THE COSTS AND ENVIRONMENTAL IMPACT OF FUSION COMPARED WITH ALTERNATIVE ENERGY SOURCES
W. R. Meier and M. J. Monsler 28 Mar. 1990 30 p
(Contract W-7405-eng-48)
(DE90-013068; UCRL-CR-103896) Avail: NTIS HC/MF A03

Based on our work during this contract and our discussions with LLNL personnel at the presentation made to LLNL on Wednesday, February 14, we have defined the following set of tasks for a study on the total cost of fusion compared to alternative energy sources. The proposed study is not intended to be exhaustive or comprehensive. It will, however, help LLNL to develop a greater understanding, to quantify some comparisons between fusion power and alternative energy sources, and to communicate the benefits of fusion to Congress and other decision makers. We recommend that the study focus on energy use in the U.S., but conclusions relative to global factors should be included to the extent possible. DOE

N92-12697# Australian National Univ., Canberra. Plasma Research Lab.
A NOVEL SCANNING INTERFEROMETER FOR TWO-DIMENSIONAL PLASMA DENSITY MEASUREMENTS
J. Howard 1989 19 p
(DE90-625514; ANU-PRL-PP-89/8) Avail: NTIS (US Sales Only) HC/MF A03

A novel multichannel scanning interferometer designed for

tomographically inferring contours of electron density in magnetically confined plasmas is described. The scanning element is a multi-sectored blazed rotating grating. The diffracted beam emerges at a different angle from each sector giving rise to a fan array of discrete beams for each rotation of the grating. Signals from the probing chords are multiplexed in time enabling the use of a single detecting element for the extraction of many channels of line integrated density information. An air turbine driven grating wheel assembly has been fabricated and initial tests performed. The proposed interferometer is to be installed on the H-1 helical axis stellarator currently under construction at the Australian National University. DOE

N92-12698# Australian National Univ., Canberra. Plasma Research Lab.
PAPERS PRESENTED AT SEVENTH INTERNATIONAL WORKSHOP ON STELLARATORS
1989 32 p Workshop held in Oak Ridge, TN, 10-14 Apr. 1989
(DE90-625560; ANU-PRL-PP-89/6; CONF-890403) Avail: NTIS (US Sales Only) HC/MF A03

Four of these papers describe research work at SHEILA, one of the two heliac stellarators at the Australian National University (ANU). They discuss configurational effects on plasma confinement, experimental studies on drift waves, electron beam measurements using a simple method of image intensification, and electron cyclotron heating experiments. The remaining three papers present aspects of the ANU's other stellarator, the H-1 flexible heliac currently under construction. Vacuum field optimization and effects of field errors on the flux surfaces of the H-1 heliac are discussed. A scanning, heterodyne interferometer, which employs a rotating disc grating as the scanning and frequency shifting element and which possesses a truly tomographic capability, is described. The H-1's ion cyclotron heating system is discussed. DOE

N92-12699# MSE, Inc., Butte, MT.
COMPENDIUM OF MHD-RELATED TERMINOLOGY
A. T. Hart, D. A. Lofftus, D. A. Rudberg, and R. A. Green (Mississippi State Univ., Mississippi State.) 1990 5 p Presented at the 28th Symposium on Engineering Aspects of Magnetohydrodynamics, Chicago, IL, 26-28 Jun. 1990
(Contracts DE-AC02-80ET-15601; DE-AC07-88ID-12735)
(DE90-012867; CONF-9006105-8) Avail: NTIS HC/MF A01

The magnetohydrodynamic (MHD) researchers in the United States have joined together in the past few years to prove the viability of the technology. As new designs for hardware methods of operation, approaches for data analysis, and levels of understanding have been attained, a set of MHD-unique terminology has been developed but not always documented. A glossary of terminology unique to the study of MHD was compiled for SEAM 27 to provide an information source for workers in this field and to assist those interested in the commercial potential of MHD in reading and understanding technical articles on the subject. The terminology defined was primarily related to the U.S. proof-of-concept program of MHD development and eventual retrofitting of a coal fired plant with MHD equipment. Basic theoretical terms as well as terminology related to the commercialization of MHD were presented. Emphasis was placed on terms related to commercialization and those related to currently active areas of study. This paper builds on the SEAM 27 contribution. Areas of concentration in this paper are retrofit/power plant terminology, advanced measurement technology applicable to MHD, research sites. DOE

N92-12700# Oak Ridge National Lab., TN.
RESISTIVE MHD TURBULENCE
B. A. Carreras 1990 71 p Presented at the Workshop on Transport and Confinement in Toroidal Devices, Santander (Spain), 2 Jul. 1990
(Contract DE-AC05-84OR-21400)
(DE90-012935; CONF-9007113-2) Avail: NTIS HC/MF A04

Plasma turbulence studies based on fluid equations are useful to develop an understanding of key concepts in magnetized plasma turbulence theory, and they have the potential to explain the plasma edge fluctuations and anomalous transport. Computers with the numerical resolution required for carrying out the necessary computational studies have only recently become available. The coupling between analytical and computational studies has led in recent years to progress in building up turbulence theory and testing renormalization prescriptions. In this paper, the resistive pressure-gradient-driven turbulence is reviewed to illustrate these points. An extended version of this paper will be published in Fizica Plazmy. DOE

N92-12701# Edgerton, Germeshausen and Grier, Inc., Idaho Falls, ID.
PHENOMENOLOGY, DIAGNOSTICS, AND NON-LTE EFFECTS IN PLASMA-PARTICLE INTERACTIONS
C. B. Shaw, Jr., S. C. Snyder, and T. L. Eddy 1990 8 p Presented at the 8th Symposium on Energy Engineering Sciences, Argonne, 9-11 May 1990
(Contract DE-AC07-76ID-01570)
(DE90-013088; EGG-M-90237; CONF-9005183-3) Avail: NTIS HC/MF A02

Two phenomena of plasma-particle interactions are reported: creation of comet-like plasma plumes downstream from each particle after initial heating, and failure of the particles (but not the comets) to follow fluctuations in the visible plasma. A diagnostic method to measure true gas temperature and flow fields in thermal plasmas by Doppler-shifted Rayleigh scattering is reported in detail. Evidence for departure of plasmas from local thermal equilibrium (LTE) is presented, and its significance briefly discussed. DOE

N92-12702# Sandia National Labs., Albuquerque, NM.
A LASER-PRODUCED LITHIUM ION SOURCE FOR PULSED-POWER INERTIAL CONFINEMENT FUSION
K. W. Bieg, G. C. Tisone, T. R. Lockner, J. E. Bailey, M. E. Cuneo, B. F. Clark, J. E. Potter, and L. P. Schanwald 1989 6 p Presented at the 8th International Conference on High-Power Particle Beams, Novosibirsk (USSR), 2-5 Jul. 1990
(Contract DE-AC04-76DP-00789)
(DE90-013401; SAND-89-2845C; CONF-9007111-4) Avail: NTIS HC/MF A02

We are investigating direct laser-produced plasmas as an ion source for the PBFA II pulsed power accelerator. Laser-generated plasmas have several potential advantages for this application, including the ability to generate a pre-formed anode plasma, simplicity, and flexibility. Previous experiments have shown that a high-density lithium plasma can be produced by direct laser irradiation of a solid lithium surface with a pulsed dye laser tuned to the Li 1s-2p resonance line at 670.8 nm (Laser Ionization Based on Resonant Saturation-LIBORS). We are also investigating a two-step approach, which uses a short-pulse Nd:YAG laser to efficiently vaporize the lithium-bearing source material, followed by LIBORS ionization of the evolving vapor to produce plasmas of mid-10(exp 16)/cu cm densities. DOE

N92-12703# Lawrence Livermore National Lab., CA.
FLASHLAMP PUMPING OF Nd:GLASS DISK AMPLIFIERS
H. T. Powell, A. C. Erlandson, K. S. Jancaitis, and J. E. Murray 12 Jun. 1990 19 p Presented at the International Conference on Optical Science and Engineering, Hague, Netherlands, 12-16 Mar. 1990
(Contract W-7405-eng-48)
(DE90-013482; UCRL-101431; CONF-900368-10) Avail: NTIS HC/MF A03

We present experimental results and a model of Nd:glass disk amplifiers which are used in inertial confinement fusion research. We first review our previous measurements on pulsed xenon flashlamps. We then discuss our measurements on the enhancement of the Nd fluorescence decay rate in laser disks by amplified spontaneous emission. Using these data, we have constructed a model of flashlamp pumping which treats the transfer efficiency of pump light from the flashlamps to the disks as an empirical function. We have found a simple description of this cavity transfer function which provides an excellent fit to the amplifier results for various pump pulselengths. We discuss the

concept of the pump area ratio for describing the flashlamp packing density and show that amplifier performance is optimized for values of this parameter near unity. We finally present results for both a single-segment and a multisegment disk amplifier. We have used these devices to investigate new amplifier designs for a large scale fusion driver. DOE

N92-12704# Science Applications International Corp., McLean, VA. Foreign Applied Sciences Assessment Center.
WEST EUROPEAN MAGNETIC CONFINEMENT FUSION RESEARCH
B. L. McKenney, ed. and M. McGrain, ed. Jan. 1990 272 p
(Contract DE-AI01-88ER-30143)
(DE90-010911; FASAC-TAR-90010911) Avail: NTIS HC/MF A12

This report presents a technical assessment and review of the West European program in magnetic confinement fusion by a panel of U.S. scientists and engineers active in fusion research. Findings are based on the scientific and technical literature, on laboratory reports and preprints, and on the personal experiences and collaborations of the panel members. Concerned primarily with developments during the past 10 years, from 1979 to 1989, the report assesses West European fusion research in seven technical areas: tokamak experiments; magnetic confinement technology and engineering; fusion nuclear technology; alternate concepts; theory; fusion computations; and program organization. The main conclusion emerging from the analysis is that West European fusion research has attained a position of leadership in the international fusion program. This distinction reflects in large measure the remarkable achievements of the Joint European Torus (JET). However, West European fusion prominence extends beyond tokamak experimental physics: the program has demonstrated a breadth of skill in fusion science and technology that is not excelled in the international effort. It is expected that the West European primacy in central areas of confinement physics will be maintained or even increased during the early 1990's. The program's maturity and commitment kindle expectations of dramatic West European advances toward the fusion energy goal. For example, achievement of fusion breakeven is expected first in JET, before 1995. DOE

N92-12705# Argonne National Lab., IL.
THE NEED FOR SUPERCONDUCTING MAGNETS FOR MHD SEAWATER PROPULSION
E. D. Doss and H. K. Geyer 1990 7 p Presented at the 25th Intersociety Energy Conversion Engineering Conference, Reno, NV, 12-17 Aug. 1990
(Contract W-31-109-eng-38)
(DE90-013651; CONF-900801-18) Avail: NTIS HC/MF A02

An MHD model that couples a one-dimensional flow model to a two-dimensional electrical model has been developed to demonstrate the need of high strength magnetic fields and to investigate the influence of friction and end losses on the performance of MHD thrusters. Parametric studies have been performed using the model that includes the variation of the applied magnetic field (5-20 T), thruster diameter (0.5-2.0 m), wall roughness (0-3 mm), flow velocity (5-20 m/s), and the load factor (1-10). The results indicate that friction and end losses can have a deleterious effect on the thruster efficiency close to a load factor equal to unity. Furthermore, the parameter studies show that the thruster efficiency increases with the strength of the magnetic field and thruster diameter and decreases with wall roughness and the flow velocity. Careful considerations should be given to the analysis and the design of MHD thrusters for load factors close to one. DOE

N92-12706# Wisconsin Univ., Madison. Dept. of Physics.
TOTAL MAGNETIC RECONNECTION DURING A TOKAMAK MAJOR DISRUPTION
J. A. Goetz, R. N. Dexter, and S. C. Prager Jul. 1990 8 p
(Contract DE-FG02-85ER-53198)
(DE90-014711; DOE/ER-53198/159) Avail: NTIS HC/MF A02

The safety factor within a tokamak plasma has been measured during a major disruption. During the disruption, the central safety factor jumps from below one to above one, while the total current is unchanged. This implies that total reconnection has occurred. This observation is in contract to the absence of total reconnection observed during a sawtooth oscillation in the same device. DOE

N92-12707# National Inst. for Fusion Science, Nagoya (Japan).
MAGNETOHYDRODYNAMIC CELLULAR AUTOMATA
Tadatsugu Hatori Feb. 1990 26 p Sponsored in part by Ministry of Education, Science and Culture
(NIFS-16; ISSN-0915-633X) Avail: NTIS HC/MF A03

There has been a renewal of interest in cellular automata, partly because they give an architecture for a special purpose computer with parallel processing optimized to solve a particular problem. The lattice gas cellular automata are briefly surveyed, which were recently developed to solve partial differential equations such as hydrodynamics or magnetohydrodynamics. A new model is given here to implement the magnetic Lorentz force in a more deterministic and local procedure than the previous one. Author

N92-12708# National Inst. for Fusion Science, Nagoya (Japan).
MAGNETIC FIELD STRUCTURE NEAR THE PLASMA BOUNDARY IN HELICAL SYSTEMS AND DIVERTOR TOKAMAKS
Kazunobu Nagasaki and Kimitaka Itoh (Kyoto Univ., Uji, Japan) Feb. 1990 52 p Sponsored in part by Ministry of Education
(NIFS-17; ISSN-0915-633X) Avail: NTIS HC/MF A04

The magnetic field structure of the scrape off layer (SOL) region in both helical systems and divertor tokamaks is studied numerically by using model fields. The connection length of the field line to the wall is calculated. In helical systems, the connection length has a logarithmic dependence on the distance from the outermost magnetic surface or from the residual magnetic islands. The effect of axisymmetric fields on the field structure is also determined. In divertor tokamaks, the connection length also has logarithmic properties near the separatrix. Even with the perturbations, which resonate to rational surfaces near the plasma boundary, are added, logarithmic properties still remain. We compare the connection length of torsatron/helical heliotron systems with that of divertor tokamaks. It is found that the former is shorter than the latter by one order of magnitude with similar aspect ratio. Author

N92-12709# Technische Univ., Eindhoven (Netherlands).
REFLECTOMETRY AND TRANSPORT IN THERMONUCLEAR PLASMAS IN THE JOINT EUROPEAN TORUS Ph.D. Thesis
Adrianus Cornelis Ca Sips 1991 127 p Sponsored by Netherlands Organization for the Advancement of Scientific Research and EURATOM
(ETN-91-90135) Avail: NTIS HC/MF A07

Thermonuclear fusion,the Joint European Torus (JET) facility (England), and the basic principles of reflectometry are described. A twelve channel reflectometer for JET is described. Measurements carried out on plasmas indicated that density fluctuations prevented the proper operation of the reflectometer. The method developed to overcome the effects of the density fluctuations is described. The study of particle and energy transport in JET plasmas is addressed. The following subjects are detailed: study of an inward propagating density pulse, generated by the heat pulse, which reaches the limiters in advance of a small outward going density pulse; calculation of the transport coefficients from the evolution of the density and heat pulse; modeling and simulation of the perturbations, including the effects of coupling between particle and energy transport. The description of measurements at a different Tokamak (Austin, U.S.) where the density pulse and heat pulse were observed to propagate with the same speed, by transport coefficients similar to those obtained in JET, is shown. ESA

N92-12710# Lawrence Livermore National Lab., CA.
AN ANALYSIS OF GRAZING INCIDENCE METAL MIRRORS IN A LASER ICF REACTOR DRIVER
R. Bieri and M. Guinan 12 Jul. 1991 40 p
(Contract W-7405-eng-48)
(DE92-000093; UCRL-ID-106094) Avail: NTIS HC/MF A03

Grazing incidence metal mirrors (GIMM's) are examined to replace dielectric mirrors for the final elements in a laser beam line for an inertial confinement fusion reactor. For a laser driver with a wavelength from 250 to 500 nm in a 10-ms pulse, irradiated mirrors made of Al, Al alloys, or Mg were found to have calculated laser damage limits of 0.3-2.3 J/cm(exp 2) of beam energy and neutron lifetime fluence limits of over 5 x 10(exp 20) 14 MeV n/cm(exp 2) when used at grazing incidence and operated at room temperature or at 77 K. A final focusing system including mirrors made of Al alloy 7475 at room temperature or at liquid nitrogen temperatures used with a driver which delivers 5 MJ of beam energy in 32 beams would require 32 mirrors of roughly 10 m(exp 2) each. This chapter includes calculations of damage limits for GIMM's and discusses critical issues relevant to the integrity and lifetime of such mirrors in a reactor environment. The reflectivities of various metals are calculated from measured optical constants at room temperature and at cryogenic temperatures for 250- to 500-nm light at both normal and grazing incidence. Then, for the mirrors in a representative system, the thermal absorption and conduction rates of the best candidate metals are used with the maximum allowable cyclic thermal stress to give the maximum allowed surface-temperature rise and surface thermal load. The allowed surface thermal load and surface reflectivity give the maximum beam energy density and the minimum size for each mirror. For mirrors made of aluminum alloy 7475 and initially operated at room temperature, the resulting optical damage threshold and allowable temperature rise give a required mirror size for each final mirror. Critical issues relevant to the integrity and lifetime of such mirrors in a reactor environment are briefly discussed. DOE

N92-12711# National Research Council of Canada, Ottawa (Ontario). Div. of Electrical Engineering.
ON THE THEORY OF IMPULSE BREAKDOWN IN GASES
M. S. Wartak and A. S. Podgorski May 1990 7 p
(NRC-31510; NRC-ERB-1029; CTN-91-60244) Copyright Avail: NTIS HC/MF A02

In recent years it has become important to have a fast, efficient, and reliable switch for pulse power systems. Two types of switches have been proposed to date: the solid state switch and the plasma switch. This report provided an analysis of the plasma switch. A microscopic description of the fast switching phenomena in gases was developed. This theory accounts for diffusion of both electrons and ions. From it, Dickey's phenomenological equation was derived. The parameters appearing in Dickey's phenomenological equation were determined for various experimental conditions. Finally, the fast switching analysis of voltage based on the phenomenological equation was done. Author (CISTI)

N92-12712# National Research Council of Canada, Ottawa (Ontario). Div. of Electrical Engineering.
SIMPLE MODEL OF THE GASEOUS PLASMA AND ITS SOLITON SOLUTIONS
M. S. Wartak and A. S. Podgorski Jan. 1990 5 p
(NRC-30824; NC-ERB-1027; CTN-91-60266) Copyright Avail: NTIS HC/MF A01

Solitons can play an important role in a gaseous plasma between two electrodes with the related problem of high speed switching in gases and in solid state devices. In this paper a simple model of a one dimensional solid interacting with a short electromagnetic pulse is formulated and solved in the slowly varying envelope approximation. A model is proposed of a system of two-level quantum oscillators interacting through nearest-neighbor coupling and coupled to an electro-magnetic field. In the continuous limit and in the slowly varying envelope approximation the system supports propagation of space solitons. CISTI

N92-12713# Technische Hochschule, Darmstadt (Germany, F.R.). Fachbereich Physik.
INTERPRETATION OF ION ENERGY SPECTRA OF LASER PLASMAS, BY RECOMBINATION MODEL Ph.D. Thesis [DEUTUNG DER IONENENERGIESPEKTREN VON LASERERZEUGTEN PLASMEN DURCH DAS REKOMBINATIONSMODELL]
Ingo Kunz 1990 101 p In GERMAN
(ETN-91-90170) Avail: NTIS HC/MF A06

Ion separation for laser plasmas, for example their production with low intensity neodymium lasers is examined. It is shown that only the recombination model can describe the relation between kinetic energy of ions and their charge number. Ion energy spectra are calculated, using a numerical model. The reference to the measured energy distributions is examined. Qualitative statements are given. A lack of knowledge of experimental initial conditions is shown as an obstacle to quantitative comparisons. ESA

N92-12714# Technische Hochschule, Darmstadt (Germany, F.R.). Fachbereich Physik.
NONLINEAR RESONANT ABSORPTION AND WAVE BREAKING (VLASOV SIMULATION OF RESONANCE EXCITED PLASMA WAVES) Ph.D. Thesis [NICHTLINEARE RESONANZABSORPTION UND WELLENBRECHEN (VLASOV-SIMULATION RESONANT ANGEREGTER PLASMAWELLEN)]
Andreas Bergmann 1990 95 p In GERMAN
(ETN-91-90172) Avail: NTIS HC/MF A05

The resonant excitation, damping, and breaking of nonlinear Langmuir waves in inhomogeneous plasma, were examined in the condensator model of the resonant absorption. The Vlasov equation for the condensator model was resolved numerically. Fast Fourier transforms were used to solve the equation for the acceleration and the vectorization of the solution algorithm, so that computation time prolongation could be kept relatively small compared to particle simulation. Wave breaking in warm plasma was defined as a loss of periodicity. The dynamics were examined at different locations, using time series of electron density, and of the electric field. ESA

N92-12715# Technische Univ., Eindhoven (Netherlands). Dept. of Physics.
A WALL STABILIZED ARC AS A LIGHT SOURCE FOR SPECTROSCOPIC TECHNIQUES Ph.D. Thesis
Arnold Theodoor Mari Wilbers 1991 157 p
(ETN-91-90308) Avail: NTIS HC/MF A08

Two deposition experiments were performed, one on carbon based films and the other on silicon thin films. The characterization of the photon source in terms of emitted radiation is studied. The light source, based on a design of a wall stabilized arc, is described. A spectroscopic ellipsometer which gives information about thickness, complex refractive index and molecular absorption bands of thin films, is described. The results of photon enhanced chemical vapor deposition of carbon and silicon thin films are presented. For individual titles, see N92-12716 through N92-12721.

N92-12716# Technische Univ., Eindhoven (Netherlands). Dept. of Physics.
CHARACTERISTIC QUANTITITES OF A CASCADE ARC USED AS A LIGHT SOURCE FOR SPECTROSCOPIC TECHNIQUES
Arnold Theodoor Mari Wilbers, G. M. W. Kroesen, C. J. Timmermans, and D. C. Schram *In its* A Wall Stabilized Arc as a Light Source for Spectroscopic Techniques 1991 p 7-30 Submitted for publication (For primary document see N92-12715 03-75)
Avail: NTIS HC/MF A08

The characteristic quantities (the electron temperature and the electron density) of an argon plasma in a cascade arc (diameter 2 and 4 mm) for a pressure range from 100,000 to 800,000 Pa and a current range from 20 to 70 ampere were determined. The absolute continuum intensity was also determined in the wavelength region from 250 nm to 320 nm and 380 nm up to 800 nm for the pressure range of 200,000, 400,000 and 600,000 Pa and 20, 40

and 60 A in case of the 2 mm arc. The plasma is close to local thermal equilibrium. Using the mentioned quantities, prediction of the absolute intensity as a function of the wavelength is possible from 140 nm to the infrared within 10 percent. The use of the arc as a light source in photon induced chemical vapor deposition, spectroscopic ellipsometry and infrared absorption spectroscopy is discussed. ESA

N92-12717# Technische Univ., Eindhoven (Netherlands). Dept. of Physics.

THE CONTINUUM EMISSION OF AN ARC PLASMA

Arnold Theodoor Mari Wilbers, G. M. W. Kroesen, C. J. Timmermans, and D. C. Schram *In its* A Wall Stabilized Arc as a Light Source for Spectroscopic Techniques 1991 p 31-53 Repr. from Journal of Quantitative Spectroscopy and Radiative Transfer, v. 45, 1991 (For primary document see N92-12715 03-75)

Avail: NTIS HC/MF A08

Free bound Biberman factors (12,000, 13,500 and 14,500 K) for the wavelength range of 250 to 320 nm and 380 to 800 nm are presented. These values were determined by measuring the absolute continuum intensity of thermal argon plasma in a cascade arc (diameter 2 mm) for a pressure range of 200,000 to 600,000 Pa and a current range of 20 to 60A. The continuum emission is corrected for free-free contributions. Two highly accurate experimental reference values of the free bound Biberman factors were used to check the electron density. Comparison with theoretical values shows also good agreement below 430 nm. Above this wavelength, theory predicts an edge structure which is not apparent in the available experimental values. The agreement between the results and recent experimental values (for which the electron density was obtained with two wavelength interferometry) is good. The influence of nonequilibrium was found to be negligible. Absolute continuum measurements are concluded to be well suited to determine electron densities (visible) and electron temperatures (UV) by using the known free bound Biberman factors. Prediction of the absolute intensity as a function of the wavelength is possible within 10 percent. ESA

N92-12718# Technische Univ., Eindhoven (Netherlands). Dept. of Physics.

THE VUV EMISSIVITY OF A HIGH PRESSURE CASCADE ARGON ARC FROM 125 TO 200 nm

Arnold Theodoor Mari Wilbers and D. C. Schram *In its* A Wall Stabilized Arc as a Light Source for Spectroscopic Techniques 1991 p 55-74 (For primary document see N92-12715 03-75)

Avail: NTIS HC/MF A08

The Vacuum Ultraviolet (VUV) emissivity of a cascade arc in argon from 125 to 200 nm was investigated. In particular, the temperature and pressure dependence of the emmissivity was studied. Further enhancement of the emissivity was obtained by adding nitrogen to the argon. At certain wavelength ranges the increase of the emissivity due to broadened lines is more than a factor of 10 in a spectral range of several nm. These lines reach the black body limit corresponding to the electron temperature of the plasma inside the arc. The electron temperature was varied between 12200 and 14500K. The relative temperature dependence of the free bound Biberman factor as a function of wavelength in this temperature range was determined from continuum measurements and compared to the theoretical temperature dependence of the free bond Biberman factors according to Hofsaess. The agreement is good. ESA

N92-12719# Technische Univ., Eindhoven (Netherlands). Dept. of Physics.

INFRARED AND ULTRAVIOLET SPECTROSCOPIC ELLIPSOMETRY USING A CASCADED ARC AS LIGHT SOURCE

G. M. W. Kroesen, M. S. deWit, Arnold Theodoor Mari Wilbers, Y. L. M. Creyghton, D. C. Schram, F. Schnitzeler, A. Straaijer, and F. J. deHoog *In its* A Wall Stabilized Arc as a Light Source for Spectroscopic Techniques 1991 p 77-99 (For primary document see N92-12715 03-75)

Avail: NTIS HC/MF A08

The construction of a spectroscopic ellipsometer with a covered spectral range of 0.25 to 8.5 microns is described. A cascaded arc is used as a light source. This source exhibits a large intensity over the complete wavelength range. Due to the poor extinction ratio of wire grid polarizers at wavelengths smaller than 5 microns, the polarizing properties of the used monochromator effect the measurements. Application of MgF2 Rochon prisms as polarizers is advisable. ESA

N92-12720# Technische Univ., Eindhoven (Netherlands). Dept. of Physics.

PHOTON ENHANCED CHEMICAL VAPOR DEPOSITION OF CARBON BASED THIN FILMS FROM TOLUENE VAPOR c76

Arnold Theodoor Mari Wilbers, J. J. Beulens, and D. C. Schram *In its* A Wall Stabilized Arc as a Light Source for Spectroscopic Techniques 1991 p 101-113 (For primary document see N92-12715 03-75)

Avail: NTIS HC/MF A08

The photon enhanced deposition of amorphous carbon films from toluene vapor condensed on a cooled substrate was investigated. In particular the dependence on the photon energy was studied. The photon energy is selected by changing the filter; pyrex (below 3.2 eV), quartz (below 7.5 eV) and LiF (below 11 eV). For the pyrex determined photon range a film is grown with a low growth rate in spite of the large number of photons incident on the condensed toluene. This film shows no detectable vibrational absorptions. In the intermediate quartz determined photon range with photon energies above the dissociation threshold the deposition rate is significantly larger (35 nm/hour) and shows two prominent absorption peaks attributed to olefinic CH2 groups. If the LiF determined photon range is added, with photon energies partly above the ionization threshold, the deposition rate is again increased to 95 nm/hour despite the small number of photons which are added by changing to the LiF range. In these films, several vibrational absorptions are present dominated by those of CH2. ESA

N92-12721# Technische Univ., Eindhoven (Netherlands). Dept. of Physics.

THE a-Si:H FILMS PRODUCED BY AN EXPANDING ARGON-SILANE PLASMA INVESTIGATED WITH SPECTROSCOPIC INFRARED ELLIPSOMETRY c76

Arnold Theodoor Mari Wilbers, G. J. Meeusen, M. Haverlag, G. M. W. Kroesen, D. C. Schram, and H. Kersten (Greifswald Univ., German D.R.) *In its* A Wall Stabilized Arc as Light Source for Spectroscopic Techniques 1991 p 115-144 Submitted for publication (For primary document see N92-12715 03-75)

Avail: NTIS HC/MF A08

Amorphous hydrogenated silicon (a-Si:H) films were produced from silane with an unconventional deposition technique, a supersonically expanding DC arc plasma. The deposited films are analyzed mainly by using spectroscopic infrared ellipsometry but also with scanning electron microscopy, infrared absorption spectroscopy and in situ He-Ne ellipsometry. The film structure appears to be strongly linked with the ionization degree and the percentage of the injected hydrogen gas. Deposition at low arc power results in films of polysilane, which are very sensitive to oxidation during exposure. Without hydrogen injection, films with a high refractive index and low hydrogen content are obtained (below the detection limit of the IR transmission spectrometer). Hydrogen injected in the middle of the plasma arc results in a-Si:H films with a refractive index of 3.75 at 632 nm; this value is close to the indices of the best films obtained with Plasma Enhanced Chemical Vapor Deposition (PECVD). The strength of SiH stretch bonds in these films is equal to the strength of the SiH2 stretch bonds. Because the bending absorptions of SiH2 at 860 and 890/cm are not detected in the produced films, it is concluded that the 2085/cm absorption peak in films is caused by SiH rather than by SiH2. As in PECVD, the optimum substrate temperature at which films of good quality are obtained is in the range of 525

to 575K. The deposition rate is in the order of several nm/s.
ESA

N92-12722# Oak Ridge National Lab., TN.
RECENT PROGRESS IN THE DEVELOPMENT OF MATERIALS FOR FUSION REACTORS
E. E. Bloom and A. F. Rowcliffe 1991 9 p Presented at the 2nd Japan International Society for the Advancement of Material and Process Engineering (SAMPE) Symposium and Exhibition, Chiba (Japan), 11-14 Dec. 1991
(Contract DE-AC05-84OR-21400)
(DE91-016283; CONF-911240-1) Avail: NTIS HC/MF A02

Development of materials with suitable properties is essential if fusion is to be realized as an economic, safe, and environmentally acceptable energy source. For each of the major reactor systems (e.g., superconducting magnets, blankets, divertors, auxiliary heating, and diagnostic devices), material requirements have been defined and alloy and ceramic systems, which have attractive properties for the various applications, have been identified. The next experimental fusion reactor, the International Thermonuclear Experimental Reactor (ITER), will utilize existing materials technology. However, for many applications in power reactors, existing materials do not have adequate properties and advanced materials must be developed. This paper presents an overview of the status of materials technology in four key areas: structural materials for the first wall and blanket (FWB), plasma-facing materials, materials for superconducting magnets, and ceramics for electrical and structural applications. DOE

N92-12723# China Nuclear Information Centre, Beijing.
STUDIES OF FINE STRUCTURE OF DISCHARGE REGION ON HT-6B TOKAMAK DEVICE
Linzhong Li, Yuping Huo, and Jikang Xie (Academia Sinica, Hefei, China) Dec. 1989 14 p In CHINESE; ENGLISH summary
(DE91-628421; CNIC-00329; ASIPP-0015) Avail: NTIS HC/MF A03

Five discharge regions with different characteristics have been found under the conditions of different derivative of n sub e similar to q(a) parameters on HT-6B Tokamak device. Two main typical regions are sawtooth region and MHD-oscillation region. There is a transition region between the two regions. Both sawtooth and MHD-oscillation discharge status can appear in the transition region. In the case of very low electron density, the energetic electron region and the runaway region emerge. In the lower q(a) transition region and its vicinity (resonant region), the external resonant helical field (RHF) has many intense effect, such as suppression of MHD oscillation, amplification of sawtooth waveform, and improvement of discharges and so on. DOE

N92-12724# China Nuclear Information Centre, Beijing.
PLASMA ELECTRON DENSITY MEASUREMENT WITH MULTICHANNEL MICROWAVE INTERFEROMETER ON THE HL-1 TOKAMAK DEVICE
Deming Xu, Hongyin Zhang, Zetian Liu, Xuantong Ding, Qirui Li, and Yangxi Wen Nov. 1989 7 p In CHINESE; ENGLISH summary
(DE91-628422; CNIC-00336; SPI-0036) Avail: NTIS HC/MF A02

A multichannel microwave interferometer which is composed of different microwave interferometers (one 2 mm band, one 4 mm band and two 8 mm band) has been used to measure the plasma electron density on HL-1 tokamak device. The electron density approaching to 5 x 10(exp 13) cu cm is measured by a 2 mm band microwave interferometer. In the determinable range, the electron density profile in the cross-section on HL-1 device has been measured by this interferometer. A microcomputer data processing system is also developed. DOE

N92-12725# China Nuclear Information Centre, Beijing.
HL-1 TOKAMAK DATA ACQUISITION SYSTEM AND ITS INITIAL APPLICATION IN THE PHYSICAL EXPERIMENT
Huichen Deng, Bo Fu, and Jiafu Dong Nov. 1989 8 p In CHINESE; ENGLISH summary
(DE91-630701; CNIC-00380; SIP-0038) Avail: NTIS HC/MF A02

A HL-1 tokamak data acquisition system has been developed and has been used in the physical experiment. The hardware and software configuration of the system, as well as the typical acquired data in the HL-1 experiment are introduced. DOE

N92-12726# Oak Ridge National Lab., TN.
FULL-WAVE CALCULATION OF FAST-WAVE CURRENT DRIVE IN TOKAMAKS INCLUDING k(SUB (PARALLEL)) UPSHIFTS
E. F. Jaeger and D. B. Batchelor 1991 6 p Presented at the 9th Topical Conference on Radio Frequency Power in Plasmas, Charleston, SC, 12-14 Aug. 1991
(Contract DE-AC05-84OR-21400)
(DE92-000048; CONF-910869-13) Avail: NTIS HC/MF A02

Numerical calculations of fast-wave current drive (FWCD) efficiency have generally been of two types: ray tracing or global wave calculations. Ray tracing shows that the projection of the wave number (k parallel) along the magnetic field can vary greatly over a ray trajectory, particularly when the launch point is above or below the equatorial plane. As the wave penetrates toward the center of the plasma, k parallel increases, causing a decrease in the parallel phase speed and a corresponding decrease in the current drive efficiency, gamma. But the assumptions of geometrical optics, namely short wavelength and strong single pass absorption, are not greatly applicable in FWCD scenarios. Eigenmode structure, which is ignored in ray tracing, can play an important role in determining electric field strength and Landau damping rates. In such cases, a full-wave or global solution for the wave fields is desirable. In full-wave calculations such as ORION, k parallel appear as a differential operator (rvec B x gradient) in the argument of the plasma dispersion function. Since this leads to a differential system of infinite order, such codes of necessity assume k(parallel) (approximately) k(var phi) = const, where k(var phi) is the toroidal wave number. Thus, it is not possible to correctly include effects of the poloidal magnetic field on k(parallel). The problem can be alleviated by expressing the electric field as a superposition of poloidal modes, in which case k(parallel) is purely algebraic. This paper describes a new full-wave calculation, Poloidal Ion Cyclotron Expansion Solution, which uses poloidal and toroidal mode expansions to solve the wave equation in general flux coordinates. The calculation includes a full solution for E(parallel) and uses a reduced-order form of the plasma conductivity tensor to eliminate numerical problems associated with resolution of the very short wavelength ion Bernstein wave. DOE

N92-12727# California Univ., Los Angeles.
THE TITAN REVERSED-FIELD-PINCH FUSION REACTOR STUDY, VOLUME 3
1990 403 p Prepared in cooperation with General Atomics, San Diego, CA; Los Alamos National Lab., NM; Rensselaer Polytechnic Inst., Troy, NY
(Contracts DE-FG03-86ER-52126; DE-AC03-84ER-53158; DE-FG02-85ER-52118; W-7405-eng-36)
(DE92-000139; UCLA/PPG-1200-Vol-3) Avail: NTIS HC/MF A18

This report discusses research on the Titan-1 fusion power core. The major topics covered are: Titan-1 fusion-power-core engineering; Titan-1 divertor engineering; Titan-1 tritium systems; Titan-1 safety design and radioactive-waste disposal; and Titan-1 maintenance procedures. DOE

N92-12728# Wisconsin Univ., Madison.
MEASUREMENT OF MAGNETIC FLUCTUATIONS AT SMALL SPATIAL SCALES IN THE TOKAPOLE 2 TOKAMAK Ph.D. Thesis
Edward Joseph Haines Aug. 1991 72 p
(Contract DE-FG02-85ER-53198)
(DE92-000161; DOE/ER-53198/180) Avail: NTIS HC/MF A04

This thesis is a presentation of the measurements of short-wavelength, high-frequency radial magnetic fluctuations

performed on the Tokapole 2 tokamak at the University of Wisconsin-Madison. Theories of electron temperature gradient eta(sub e) driven turbulence predict the existence of increased magnetic fluctuation power at small spatial scales near the collisionless skin depth c/omega(sub pe) and over a wide range of frequencies near and below the electron diamagnetic drift frequency omega*(sub ne). Small magnetic probes of sizes down to 1 m m have been constructed and used to resolve short poloidal and radial wavelength magnetic fluctuations. These probes have been used with larger probes to make comparisons of fluctuation spectra measured in various ranges of wavelength and over the range of frequencies from 10 kHz to 6 MHz in Tokapole 2 plasmas. A calculation of the short-wavelength, high-frequency response of an electrostatically shielded model B(sub r) probe has been performed to guide the interpretation of the power comparison measurements. Comparisons of magnetic fluctuation spectra at various positions within the plasma, and for discharges with edge safety factor 1, 2, and 3 are presented. The linear and nonlinear theories and numerical simulations of eta(sub e) turbulence are reviewed and compared, where possible with the experimental parameters and results. DOE

N92-12729# Wisconsin Univ., Madison. Dept. of Physics.
SOFT X-RAY MEASUREMENT OF INTERNAL TEARING MODE STRUCTURE IN A REVERSED-FIELD PINCH
George Athanasios Chartas and Samuel Hokin 16 Sep. 1991 13 p
(Contract DE-FG02-85ER-53198)
(DE92-000164; DOE/ER-53198/182) Avail: NTIS HC/MF A03

The structure of internally resonant tearing modes has been studied in the Madison Symmetric Torus reversed-field pinch with a soft x-ray detector system consisting of an imaging array at one toroidal location and several detectors at different toroidal locations. The toroidal mode numbers of m=1 structures are in the range n=-5,-6,-7. The modes propagate with phase velocity v=1-6 x 10(exp 6) cm/s, larger than the diamagnetic drift velocity v(sub d) approximately 5 x 10(exp 5) cm/s. Phase locking between modes with different n in manifested as a beating of soft x-ray signals which is found to be strongest near the resonant surfaces of the modes (r/a = 0.1-0.5). DOE

N92-12730# Los Alamos National Lab., NM.
AN ALGORITHM FOR DETERMINING EF COILS FROM FIXED-BOUNDARY EQUILIBRIA APPLIED TO ARIES 3
Charles Bathke, S. C. Jardin, and C. E. Kessel (Princeton Univ., NJ.) 1991 5 p Presented at the 14th IEEE Symposium on Fusion Engineering, San Diego, CA, 30 Sep. - 3 Oct. 1991
(Contract W-7405-eng-36)
(DE92-000170; LA-UR-91-3130; CONF-910968-3) Avail: NTIS HC/MF A01

An algorithm that determines the external EF (Equilibrium Field) coils required to produce equilibria calculated by high-resolution, fixed-boundary codes is described. The algorithm permits the specification of the poloidal-field-null location. The EF-coil positions on a specified surface located just outside of the TF (Toroidal Field) coils are optimized to minimize the stored magnetic energy. Results of the application of this algorithm to ARIES-3 are also presented. DOE

N92-12731# Los Alamos National Lab., NM.
OVERVIEW OF THE LOS ALAMOS NATIONAL LABORATORY INERTIAL CONFINEMENT FUSION PROGRAM
D. B. Harris 1991 14 p Presented at the Annual Meeting and Symposium of the Fusion Power Associates, Princeton, NJ, 25-26 Jun. 1991
(Contract W-7405-eng-36)
(DE92-000199; LA-UR-91-3019; CONF-9106182-3) Avail: NTIS HC/MF A03

The Los Alamos Inertial Confinement Fusion (ICF) Program is focused on preparing for a National Ignition Facility. Target physics research is addressing specific issues identified for the Ignition Facility target, and materials experts are developing target fabrication techniques necessary for the advanced targets. We are also working with Lawrence Livermore National Laboratory on the design of the National Ignition Facility target chamber. Los Alamos is also continuing to develop the KrF laser-fusion driver for ICF. We are modifying the Aurora laser to higher intensity and shorter pulses and are working with the Naval Research Laboratory on the development of the Nike KrF laser. DOE

N92-12732# General Atomic Co., San Diego, CA.
THE MULTIPULSE THOMSON SCATTERING DIAGNOSTIC ON THE D3-D TOKAMAK
T. N. Carlstrom, G. L. Campbell, J. C. DeBoo, R. G. Evanko, J. Evans, C. M. Greenfield, J. S. Haskovec, C. L. Hsieh, E. L. McKee, and R. T. Snider et al Sep. 1991 4 p Presented at the 14th IEEE Symposium on Fusion Engineering, San Diego, CA, 30 Sep. - 3 Oct. 1991
(Contract DE-AC03-89ER-51114)
(DE92-000262; GA-A-20614; CONF-910968-5) Avail: NTIS HC/MF A01

This paper describes the design and operation of a 40-spatial channel Thomson scattering system that uses multiple 20 Hz Nd:YAG lasers to measure the electron temperature and density profiles periodically throughout an entire plasma discharge. Interference filter polychromators disperse the scattered light which is detected by silicon avalanche photodiodes. The measurable temperature range from 10 eV to 20 keV and the minimum detectable density is about 2 x 10(exp 18) m(exp -3). Laser control and data acquisition are performed in real-time by a VME-based microcomputer. Data analysis is performed by a MicroVAX 3400. Unique features of this system include burst mode operation, where multiple lasers are fired in rapid succession (less than 10 KHz); real-time analysis capability; and laser beam quality and alignment monitoring during plasma operation. Results of component testing, calibration, and plasma operation are presented. DOE

N92-12733# General Atomic Co., San Diego, CA.
A SYSTEM TO DEPOSIT BORON FILMS (BORONIZATION) IN THE D3-D TOKAMAK
T. R. Hodapp, G. L. Jackson, J. Phillips, K. L. Holtrop, P. I. Petersen, and J. Winter Sep. 1991 4 p Presented at the 14th IEEE Symposium on Fusion Engineering, San Diego, CA, 30 Sep. - 3 Oct. 1991
(Contract DE-AC03-89ER-51114)
(DE92-000288; GA-A-20624; CONF-910968-6) Avail: NTIS HC/MF A01

A system has been added to the D3-D tokamak to coat its plasma facing surfaces with a film of boron using diborane gas. The system includes special health and safety equipment for handling the diborane gas which is toxic and inflammable. The purpose of the boron film is to reduce the levels of impurity atoms in the D3-D plasmas. Experiments following the application of the boron film in D3-D have led to significant reductions in plasma impurity levels and the observation of a new, very high confinement regime. DOE

N92-12734# Oak Ridge National Lab., TN.
TRITIUM PROOF-OF-PRINCIPLE PELLET INJECTOR
P. W. Fisher Jul. 1991 71 p
(Contract DE-AC05-84OR-21400)
(DE92-000390; ORNL/TM-11781) Avail: NTIS HC/MF A04

The tritium proof-of-principle (TPOP) experiment was designed and built by Oak Ridge National Laboratory (ORNL) to demonstrate the formation and acceleration of the world's first tritium pellets for fueling of future fusion reactors. The experiment was first used to produce hydrogen and deuterium pellets at ORNL. It was then moved to the Tritium Systems Test Assembly at Los Alamos National Laboratory for the production of tritium pellets. The injector used in situ condensation to produce cylindrical pellets in a 1-m-long, 4-mm-ID barrel. A cryogenic He-3 separator, which was an integral part of the gun assembly, was capable of lowering He-3 levels in the feed gas to less than 0.005 percent. The experiment was housed to a glovebox for tritium containment. Nearly 1500 pellets were produced during the course of the experiment, and about a third of these were pure tritium or mixtures

of deuterium and tritium. Over 100 kCi of tritium was processed through the experiment without incident. Tritium pellet velocities of 1400 m/s were achieved with high-pressure hydrogen propellant. The design, operation, and results of this experiment are summarized. DOE

N92-12735# MSE, Inc., Butte, MT.
MAGNETOHYDRODYNAMIC PROJECTS AT THE CDIF
1991 13 p
(Contract DE-AC07-88ID-12735)
(DE92-000396; DOE/ID-12735/T18) Avail: NTIS HC/MF A03

This quarterly technical progress report presents the tasks accomplished at the Component Development and Integration Facility (CDIF) during the second quarter of FY91. Areas of technical progress this quarter included: coal system development; seed system development; test bay modification; channel power dissipation and distribution system development; oxygen system storage upgrade; iron-core magnet thermal protection system checkout; TRW slag rejector/CDIF slag removal project; stack gas/environmental compliance upgrade; coal-fired combustor support; 1A channels fabrication and assembly; support of Mississippi State University diagnostic testing; test operations and results; data analysis and modeling; technical papers; and projected activities. DOE

N92-12736# Oak Ridge National Lab., TN.
THE ION CYCLOTRON HEATING (ICH) SYSTEM FOR BPX
D. W. Swain, J. J. Yugo, D. E. Williamson, D. B. Batchelor, M. D. Carter, and R. H. Goulding 1991 5 p Presented at the 14th IEEE Symposium on Fusion Engineering, San Diego, CA, 30 Sep. - 3 Oct. 1991
(Contract DE-AC05-84OR-21400)
(DE92-000426; CONF-910968-7) Avail: NTIS HC/MF A01

The ICH system is required to deliver at least 20 MW of RF power to the BPX plasma for pulse lengths of up to 15 s over a range of plasma operating conditions (e.g., average plasma densities from 0.5 to 4.5 x 10(exp 20) m(exp -3), toroidal fields from 5 to 8 T). The power must be delivered to the plasma over a range of frequencies corresponding to the different operating conditions. On the basis of calculations of the load resistance that the antennas will see because of the presence of the plasma, circuit analysis of the rf system indicates that the present ICH design should easily be able to deliver this amount of power to the plasma. Some research and development (R&D) must be done to provide a reliable system in the BPX radiation environment. DOE

N92-12737# Oak Ridge National Lab., TN.
EFFECTS OF AMBIENT BACKGROUND GASES ON YBCO PLUME PROPAGATION UNDER FILM GROWTH CONDITIONS: SPECTROSCOPIC, ION PROBE, AND FAST PHOTOGRAPHIC STUDIES
D. B. Geohegan Sep. 1991 17 p Presented at the European Materials Research Society (E-MRS) Summer School on Laser Ablation of Electronic Materials: Basic Mechanisms and Applications, Carcans-Maubuisson (France), 16-19 Sep. 1991
(Contract DE-AC05-84OR-21400)
(DE92-000431; CONF-9109286-2) Avail: NTIS HC/MF A03

The formation, composition, and propagation of KrF laser-produced plasmas from Y1Ba2Cu3O(7-x) have been studied with emphasis on topics relevant to film growth by pulsed-laser deposition. Spatially and temporally resolved, high-resolution optical absorption and emission spectroscopy, fast ion probes, and fast photography (obtained with a gated, image-intensified CCD array detector (ICCD)) are employed to investigate both emitting and non-emitting species in the laser plume as well as the overall shape and propagation of the laser plasma in background gases of oxygen and xenon. Transient optical absorption spectroscopy is applied to study the composition of the plume of ejected material from the dense layer near the target surface to distances of several centimeters. Optical absorption persists long after the decay of plasma fluorescence, indicating a slower component to plume transport. The absorption of YO formed by YBCO ablation in vacuum and by-yttrium ablation in oxygen is presented. Fast electric ion probes are utilized to measure velocities and total collected charge of the positive ions in the expanding YBCO laser plasma from near-threshold, vacuum conditions into the high fluence, background gas conditions utilized for thin-film growth. The exponential attenuation of the positive ion flux transmitted through 50-300 mTorr background oxygen is measured and used to define an attenuation coefficient. The showing of the laser plasma and formation of shock structures due to gas collisions is studied by ion probe measurements and fast ICCD photography. A comparison between shock wave propagation and drag models is presented to describe the arrival time and shape of the ion probe current waveform with distance. DOE

N92-12738# Argonne National Lab., IL. Fusion Power Program.
INDUCTIVE CURRENTS IN AN RF DRIVEN PLASMA
J. Kinsey and D. A. Ehst Aug. 1991 14 p
(Contract W-31-109-eng-38)
(DE92-000491; ANL/FPP/TM-256) Avail: NTIS HC/MF A03

Inductive effects are included in a self-consistent current drive model for axisymmetric tokamak plasmas used in the two-dimensional current drive/MHD equilibrium code, RIP. Previous simulations of current driven equilibria allowed for the steady-state calculation of bootstrap and RF currents. The addition of an inductive current is applied to enhance accurate design and interpretation of tokamak experiments. A convenient expression for the ohmic resistance in a tokamak plasma is derived to aid in the design of reactor grade MHD equilibria. DOE

N92-12739# Oak Ridge National Lab., TN.
ELECTROMAGNETIC LOADS ON ITER IN-VESSEL COMPONENTS
D. E. Williamson, D. L. Conner, B. E. Nelson, R. O. Sayer, and J. J. Yugo 1991 4 p Presented at the 14th IEEE Symposium on Fusion Engineering, San Diego, CA, 30 Sep. - 3 Oct. 1991
(Contract DE-AC05-84OR-21400)
(DE92-000672; CONF-910968-14) Avail: NTIS HC/MF A01

Design of the vacuum vessel and internal blanket/shield modules for the International Thermonuclear Experimental Reactor (ITER) is strongly influenced by the magnitude of electromagnetic loads due to plasma disruption. Calculations with the finite element code, EddyCuFF, have been performed to quantify these loads and incorporate them into the design process. A multifilament model of plasma motion and current decay has been developed using data generated by the Tokamak Simulation Code (TSC). Comparison with calculations employing single filament plasma models illustrates the need to use self-consistent, distributed plasma scenarios when analyzing toroidally segmented components. Application is made to design and analysis of the high aspect ratio design (HARD) option vessel and blanket/shield modules. Variations in geometry, response characteristics, and electromagnetic loads are compared to the reference design values. DOE

76 SOLID-STATE PHYSICS

Includes superconductivity.

For related information, see also *33 Electronics and Electrical Engineering* and *36 Lasers and Masers.*

N92-12740# Los Alamos National Lab., NM.
PRINCIPLES OF SUPERCONDUCTOR IMAGING SURFACE GRADIOMETRY
D. B. vanHulsteyn, W. C. Overton, Jr., and E. R. Flynn 1990 3 p Presented at the 19th International Conference on Low Temperature Physics, Brighton, England, 16-22 Aug. 1990
(Contract W-7405-eng-36)
(DE90-008916; LA-UR-90-1013; CONF-900806-2) Avail: NTIS HC/MF A01

Magnetic sources in the vicinity of superconducting surfaces produce images in such a way that a single pick-up coil parallel to the surface acts as a first order gradiometer. The principles

will be described, together with specific discussions of the imaging by planar and spherical surfaces. The fact that these surfaces also deflect noise due to remote sources make this concept particularly appealing as a method for detecting extremely weak sources in a hostile environment. Possible applications to neuromagnetometry, corrosion detection and non-destructive evaluation will be discussed. DOE

N92-12741# Oak Ridge National Lab., TN.
EVIDENCE OF WEAK PAIR COUPLING IN THE PENETRATION DEPTH OF BI-BASED HIGH-Tc SUPERCONDUCTORS
J. R. Thompson, Yang Ren Sun, J. G. Ossandon, D. K. Christen, B. C. Chakoumakos, B. C. Sales, H. R. Kerchner, and E. Sonder 1990 4 p Presented at the LT-19 Satellite Conference on High-temperature Superconductivity, Cambridge, England, 13-15 Aug. 1990
(Contract DE-AC05-84OR-21400)
(DE90-009415; CONF-900817-1) Avail: NTIS HC/MF A01

The magnetic penetration depth (lambda T) has been investigated in Bi(Pb)SrCaCuO high-(Tc) compounds having 2- and 3-layers of copper-oxygen per unit cell. Studies of the magnetization in the vortex state were employed and the results were compared with weak and strong coupling calculations. The temperature dependence of (lambda) is described well by BCS theory in the clean limit, giving evidence for weak pair coupling in this family of materials. For the short component of the (lambda) tensor, we obtain values of 292 and 220 nm (T equals 0) for Bi-2212 and (BiPb)-2223, respectively. DOE

N92-12742# California Univ., Berkeley. Lawrence Berkeley Lab.
PRESSURE DEPENDENCE OF THE SPECIFIC HEAT OF HEAVY-FERMION YbCu4.5
A. Amato, R. A. Fisher, N. E. Phillips, D. Jaccard, and E. Walker Mar. 1990 4 p Presented at the 19th International Conference on Low Temperature Physics, Brighton, England, 16-22 Aug. 1990
(Contract DE-AC03-76SF-00098)
(DE90-011584; LBL-28749; CONF-900806-7) Avail: NTIS HC/MF A01

The specific heat of a polycrystalline sample of YbCu4.5 has been measured between 0.3 and 20 K at pressures to 8.2 kbar. Unlike cerium-based heavy fermion compounds, an increase of C/T is observed with increasing pressure, with the linear term enhanced by about 16 pct. at 8.2 kbar. Above 7 K_P (partial derivative C/(partial derivative P) sub T is negative. The nuclear contribution observed at P = 0 is increased by roughly a factor of two at 8.2 kbar. DOE

N92-12743# Brookhaven National Lab., Upton, NY.
THE PERFORMANCE OF A SUPERCONDUCTING MICRO-UNDULATOR PROTOTYPE
I. Ben-Zvi, Z. Y. Jiang, G. Ingold, L. H. Yu, and W. B. Sampson May 1990 16 p
(Contract DE-AC02-76CH-00016)
(DE90-012639; BNL-44677) Avail: NTIS HC/MF A03

We report on the performance of a prototype of a super-ferric micro-undulator. The micro-undulator consists of a continuous winding of niobium-titanium wire wound on a low carbon steel yoke. It is about 3 periods long with a period of 8.8 mm and a gap of 4.4 mm. The undulator achieves the a peak magnetic field on axis of over 0.5 Tesla. Asymmetry of the field pattern due to a dipole component was identified, analyzed and a correction has been applied to the undulator ends to produce a symmetric field distribution. Within the precision of the measurement the field pattern produced by the super-ferric undulator needed no correction. DOE

N92-12744# California Univ., Berkeley. Lawrence Berkeley Lab.
SPECIFIC HEAT OF La(2-x)Sr(x)CuO4; VOLUME FRACTION OF SUPERCONDUCTIVITY; POSSIBLE STRUCTURAL TRANSITION AT 45 K
A. Amato, R. A. Fisher, N. E. Phillips, and J. B. Torrance Mar. 1990 5 p Presented at the 19th International Conference on Low Temperature Physics, Brighton, England, 16-22 Aug. 1990
(Contract DE-AC03-76SF-00098)
(DE90-011585; LBL-28750; CONF-900806-8) Avail: NTIS HC/MF A01

Specific heat measurements on La(1.85)Sr(0.15)CuO4 show a linear correlation of the zero field low temperature linear term with the discontinuity at (T sub c), each of which provides a measure of the superconducting volume fraction. The correlation leads to an estimate of the normal state density of electronic states which, together with the band structure calculated value, gives an electron-phonon interaction parameter that is too small to account for the superconductivity. For a sample with x = 0.30 magnetic field insensitive anomaly in specific heat near 45 K was observed which may be related to a structural phase transition. DOE

N92-12745# Ohio State Univ., Columbus. Dept. of Physics.
THEORY OF EXOTIC SUPERCONDUCTING AND NORMAL STATES OF HEAVY ELECTRON AND HIGH T(SUB c) MATERIALS
1990 5 p
(Contract DE-FG02-87ER-45326)
(DE90-012688; DOE/ER-45326/3) Avail: NTIS HC/MF A01

This paper discusses: quadrupole Kondo effect; heavy electron transport properties; quadrupolar fluctuation mechanism for high-(Tc) superconductors; research accomplishments for the t-J model of high-(Tc) superconductors; interpretation of high-(Tc) superconductors experimental data; and dynamics of strongly correlated systems. DOE

N92-12746# Centro Brasileiro de Pesquisas Fisicas, Rio de Janeiro.
A SIMPLE MODEL FOR LOCALIZED-ITINERANT MAGNETIC SYSTEMS: CRYSTAL FIELD EFFECTS
L. Iannarella (Universidade Federal do Rio de Janeiro, Brazil), X. A. daSilva, and A. P. Guimarares 1989 15 p
(DE90-625399; CBPF-NF-034/89) Avail: NTIS (US Sales Only) HC/MF A03

The magnetic behavior of a system consisting of localized electrons coupled to conduction electrons and submitted to an axial crystal field at T=0 K is investigated within the framework of the molecular field approximation. An analytical ionic magnetic state equation is deduced; it shows how the magnetization depends on the model parameters (exchange, crystal field, and band occupation) and external magnetic field. A condition for the onset of spontaneous magnetic order is obtained and the ferro- and paramagnetic-phases are studied. This study displays several features of real magnetic systems, including quenching or total suppression of the magnetic moments (depending on the relative value of the crystal field parameter) and exchange enhancement. The relevance of such a model for the description of rare-earth intermetallic compounds is discussed. DOE

N92-12747# Sandia National Labs., Albuquerque, NM.
SUPERCONDUCTING La2CuO(4+x) PREPARED BY OXYGENATION AT HIGH PRESSURE: A RAMAN SCATTERING STUDY
K. F. McCarty, J. E. Schirber, S. W. Cheong, and Z. Fisk (Los Alamos National Lab., NM.) 1990 12 p Presented at the SPIE Conference on Raman and Luminescence Spectroscopies in Technology, San Diego, CA, 10-12 Jul. 1990
(Contracts DE-AC04-76DP-00789; W-7405-eng-36)
(DE90-012915; SAND-90-1670C; CONF-9007114-1) Avail: NTIS HC/MF A03

Superconducting crystals of La2CuO(4+x) prepared by high-pressure oxygenation have been analyzed by Raman spectroscopy. A direct comparison of the role of excess oxygen was made by examining the same crystals with and without excess oxygen. La2CuO(4+x), like non-superconducting La2CuO(4.0), is found to have a soft phonon that drives an orthorhombic to tetragonal phase transition. In both its tetragonal and orthorhombic forms, La2CuO(4+x) has a phonon peak at 630 cm(exp -1) that is absent in La2CuO(4.0). The frequency of this peak is suggestive

of a peroxide-like species in La2CuO(4+x) occur at essentially the same frequency. While La2CuO(4.0) has a well-defined peak from double-magnon scattering, no well-defined double-magnon scattering is observed in La2CuO(4+x), even in its phase separated form. DOE

N92-12748# Los Alamos National Lab., NM.
PHASE DIAGRAM OF ANISOTROPIC TWO-DIMENSIONAL QUARTER-FILLED BAND OF INTERACTING ELECTRONS
S. Mazumdar (Arizona Univ., Tucson.), H. Q. Lin, and D. K. Campbell 1990 10 p Presented at the International Conference on Organic Superconductors, Lake Tahoe, 20-24 May 1990
(Contract W-7405-eng-36)
(DE90-013171; LA-UR-90-2021; CONF-900528-2) Avail: NTIS HC/MF A02

Ever since its original discovery, the magnetic field induced spin density wave (FISDW) transition observed in superconducting TMTSF salts has continued to be of considerable interest. This phenomenon has been studied most widely in the ambient pressure superconductor (TMTSF)2ClO4, where for moderate magnetic fields H greater than H(sub f) a cascade of transitions to semimetallic SDW phases was observed. Until very recently, it was generally accepted that the theoretical explanation for the FISDW lied in the gradual one dimensionalization of the Fermi surface in the presence of the magnetic field and the accompanying nesting instability. These theories do not account for the more recently discovered very high field transition (VFHT) for H greater than H(sub v). In contrast to the predictions of the above theories the SDW transition temperature T(sub SDW) actually decreases for H greater than 17T and then goes to zero at H = 25-30T. At present, there exists only one theoretical attempt to explain the VFHT. Within this model the material is at the one dimensional limit for very high fields, and the competition between the equally strong Peierls and Cooper channels in this limit destroys the FISDW. The system is then an ordinary metal for H greater than H(sub v). We believe that the very high field phase is not an ordinary metal. It is characterized by a high resistivity, activated conductivity and vanishing Hall signal. All of these suggest that the system is a semimetal, and perhaps even a narrow gap semiconductor. In addition the system is diamagnetic in this region, which also suggests that its nature is different from simple metallic. In the present paper we present preliminary work on a slightly different theoretical model. We believe that the model presented here describes charge transfer solids in general, and FISDW behavior in particular, better. DOE

N92-12749# Sandia National Labs., Albuquerque, NM.
STOICHIOMETRY AND IRRADIATION EFFECTS IN MELT GROWN Tl-Ca-Ba-Cu-O SINGLE CRYSTALS
E. L. Venturini, C. P. Tigges, R. J. Baughman, B. Morosin, J. C. Barbour, M. A. Mitchell, and D. S. Ginley 1990 12 p Presented at the 8th American Conference on Crystal Growth, Vail, 15-20 Jul. 1990
(Contract DE-AC04-76DP-00789)
(DE90-013365; SAND-90-1573C; CONF-900738-2) Avail: NTIS HC/MF A03

Melt-grown crystals in the Tl-Ca-Ba-Cu-O system with the same structure type can have substantial differences in the superconducting transition, both in width and onset temperature. These differences are attributed to stoichiometry variations arising from cation site substitution. Magnetization and electrical resistivity data are presented which emphasize the extreme sensitivity of the superconductivity to the exact stoichiometry in this system. High quality single crystals exhibit large flux creep due to a weak pinning potential for magnetic flux lines. Flux pinning and thus the critical current density are shown to be significantly enhanced by irradiation with high-energy protons or neutrons. DOE

N92-12750# California Univ., Berkeley. Lawrence Berkeley Lab.
THE ROLE OF INHIBITORS DURING ELECTRODEPOSITION OF THIN METALLIC FILMS Ph.D. Thesis
M. J. Armstrong (California Univ., Berkeley.) May 1990 195 p
(Contract DE-AC03-76SF-00098)
(DE90-014177; LBL-28972) Avail: NTIS HC/MF A09

The role of brightening agents during the deposition of thin metal films was analyzed. The model brightening system studied was copper deposition in the presence of benzotriazole (BTA). Emphasis was placed on the early stages of deposition. The development of microtopography was characterized with in situ scanning tunneling microscopy. Cuprous-BTA film formation was measured with impedance spectroscopy. Copper electrochemistry was measured with double-pulse potentiometry. The incorporation of BTA, including the effects of mass transport conditions, was studied with x ray photoelectron spectroscopy and secondary ion mass spectroscopy. A visual survey of deposits from 0.5 M CuSO4, 0.5 M H2SO4 indicated that brightening occurs when the concentration of BTA is greater than 100 microM and the current density is greater than 50 mA/sq cm. A passive layer was found to form during cathodic polarization of copper in 0.5 M CuSO4, 0.5 M H2SO4 with 100 and 200 microM BTA. Followingbreakdown of the passive layer, with increased polarization, the copper remains covered with a BTA film with a coverage following Langmuir adsorption kinetics. Benzotriazole was not incorporated into the copper deposits. The nucleation site density of Cu on Pt was only a function of overpotential irrespective of the BTA concentration. The presence of BTA increases the overpotential (resulting in an increase in nucleation rate) for a given current density which results in a decreased particle size. Benzotriazole altered the morphology of the deposited Cu. Deposits from BTA free electrolyte consisted of flat planes terminated with ledges with growth occurring at the ledges. Deposits from BTA containing electrolyte consisted of hemispheres with growth occurring uniformly on the surface. DOE

N92-12751# Queens Univ., Kingston (Ontario). Dept. of Physics.
PIEZOELECTRIC DEVICES USING SOL GEL THIN FILMS Final Report
M. Sayer and G. Yi 3 May 1990 63 p
(Contract DSS-31950-9-0001/01-XSD)
(NRC-31370; NRC-IGM90D-401-993-G; CTN-91-60251) Avail: NTIS HC/MF A04

A sol gel process for the fabrication of piezoelectric thin films has been developed which provide crack free films of lead zirconate titanate (PZT) on a range of substrates. A description of the technical basis for this development is provided. An extensive analysis has been carried out of mechanisms which lead to crack free film preparation. Experimental systems constructed to produce films include facilities for dip coating, thermo gravimetric analysis and vacuum drying. Substrates that have been utilized include aluminum oxide, quartz, platinum, glass, indium tin oxide and bare and metallized silicon. The piezoelectric and ferroelectric performance of these films is comparable to that of bulk ceramic. The major areas of application of the materials and devices are in acoustic lenses and devices, acousto-optic fiber technology, and the general use of PZT thick films in micro-actuators. A major novel device is the in-line acoustic modulator using fiber optics. CISTI

N92-12752# National Research Council of Canada, Boucherville (Quebec). Industrial Materials Research Inst.
CRYSTALLIZATION BEHAVIOR AND EFFECT OF THERMAL HISTORY ON FRACTURE PERFORMANCE OF GLASS FLAKE REINFORCED POLYPROPYLENE
T. Vu-Khanh and J. Denault 1988 35 p
(NRC-29450; NRC-IGM88AP-103-773-G; CTN-91-60296)
Copyright Avail: NTIS HC/MF A03

In this work, the role of interface and matrix morphology in fracture behavior of glass flake reinforced polypropylene was investigated. Differential scanning calorimetric analysis showed that a silane coupling agent modified the crystallization behavior of the polypropylene matrix. The presence of dry blend silane treated glass flakes in polypropylene was found to induce the nucleation process and decrease the overall rate of crystallization. The effect

of matrix morphology on the fracture performance was analyzed by post-yield fracture mechanics on samples of different levels of crystallinity. An increase in matrix crystallinity in pure polypropylene and glass flakes polypropylene composites led to a reduction in the maximum crack growth resistance. The lower ductility of a more cystalline matrix resulted in a reduction of the energy dissipated in the matrix stretching and therefore, a concomitant decrease in the fracture energy. Although the effect of matrix morphology seemed to be very important in the case of pure polypropylene and untreated glass flake polypropylene composites, this effect was found to be negligible for the silane treated composites. Nevertheless, microscopic observation of the fracture surfaces of silane treated composites also revealed a reduction in the ductility of the matrix in highly crystalline samples. An improvement in the matrix-filler interface seemed to inhibit the effect of matrix morphology on the fracture behavior of glass flake polypropylene composites. Author (CISTI)

N92-12753# Laboratoire d'Automatique et d'Analyse des Systemes, Toulouse (France). Systemes Integres de Perception.
DESIGN AND STUDY OF PHOTON-ASSISTED HETEROEPITAXIAL GROWTH SYSTEM Ph.D. Thesis - Toulouse Univ.
Abdelhamid Laamouri 1991 157 p In FRENCH; ENGLISH summary
(LAAS-91187; ETN-91-90126) Avail: NTIS HC/MF A08

Development of heterogeneous integration for optoelectronic and sensor applications is discussed. Improvement of the quality of high mismatch layers obtained is the final objective of the research. The study and design of an experimental set up that permits the growth of compound semiconductors is presented. Low pressure photo-assisted metallorganical vapor phase epitaxy is chosen. The system is equipped with an in situ probe of the epitaxial growth process based on the detection of any intensity modulation of the photoemission current near threshold. The interest in photons for stimulation of the epitaxial process is due to the amount of work done in this field. It is shown that the layers obtained during photonic irradiation could be improved by an activated mechanism of nonradiative recombination of the photogenerated carrier. Interpretation of the photoemission signal and particularly the physical origin of the observed oscillations during growth of GaAs by MBE is studied. It is assumed that the photoemission properties depend on the chemical nature of the absorbed atoms and on their local configurations. In this way, a theoretical model is developed that associates a simple growth model with atomic photoemission models. The results obtained exhibit the same features observed experimentally and seem to be strongly dependent on the As2 and Ga molecular and atomic adsorption mechanisms, on the roughness of the growing layer and on the growth mode (two or three dimensions). ESA

N92-12754# Technische Univ., Berlin (Germany, F.R.). Fachbereich Physik.
ORIENTATION DEPENDENCY OF STRUCTURAL AND CHEMICAL PROPERTIES OF Si(001) VICINAL SURFACES Ph.D. Thesis [ORIENTIERUNGSABHAENGIGKEIT STRUKTURELLER UND CHEMISCHER EIGENSCHAFTEN VON Si(001)-VIZINALFLAECHEN]
Eckart Schroeder-Bergen 1991 129 p In GERMAN Sponsored by DFG
(ETN-91-90154) Avail: NTIS HC/MF A07

The clean and absorbate covered surface of a silicon monocrystal with spherical surfaces was examined by Spot Profile Analysis Low Energy Electron Diffraction (SPALEED), and Ultraviolet Photoelectron Spectroscopy (UPS). The considered orientation field extended over surfaces which were tilted towards (001) and maximum 13 deg around various axes. The SPALEED measurement on clean surfaces showed staged vicinal surfaces. UPS examinations after adsorption of H2O at 350K, and of H2S at 150K showed that both bodies adsorb dissociatively over a mobile precursor. Up to a tilting of 9 deg to (001), the adsorption shows the same kinetics and spectral form as on (001) on the vicinal surfaces. For higher angles of tilt, a deflecting spectral form and saturation occupation were obtained. ESA

N92-12755# Aerospatiale, Paris (France).
AN ANALYSIS OF THERMOSOLUTAL CONVECTION DURING THE CRYSTAL GROWTH OF CdTe FROM Te SOLUTION BY THE THM
Joel Boucherie, Eric Arquis (Bordeaux 1 Univ., Talence, France), and Jean-Claude Launay 1991 22 p In FRENCH; ENGLISH summary Presented at the ECCG-3, Budapest, Hungary, 5-11 May 1991
(Rept-911-430-135; ETN-91-90266) Avail: NTIS HC/MF A03

Ways of using numerical simulation to better understand and predict how natural convection in a melt affects crystal growth are studied. Crystal growth both on Earth and in microgravity environments is discussed. The evolution of melting and solidification interface shape with convective parameters is described. The AMF 117 experiment planned to be part of the EURECA 1 program is described. In this experiment the CdTe crystal will grow by the Traveling Heater Method (THM). The structure of the temperature, concentration and flow fields as well as the interface solution are analyzed. ESA

N92-12756# Argonne National Lab., IL. Materials and Components Technology Div.
STRENGTHENING OF COMPOSITES BY INTERNAL STRESSES: DETERMINATION BY NEUTRON DIFFRACTION
J. P. Singh, D. S. Kupperman, and S. Majumdar Aug. 1991 14 p Presented at the 1st International Symposium on the Science of Engineering Ceramics, Koda, Japan, 21-23 Oct. 1991
(Contract W-31-109-eng-38)
(DE91-018549; ANL/CP-72064; CONF-911084-3) Avail: NTIS HC/MF A03

The bulk internal stresses in the constituents of two composites (Ag particulate dispersed YBa2Cu3O(x) superconductors and SiC-whisker-reinforced Al2O3 matrix) were measured by neutron diffraction technique. For YBa2Cu3O(x)-Ag composites, the tensile strain in the Ag phase was as high as 0.085 percent, while compressive strain in the YBa2Cu3O(x) phase was as high as 0.09 percent. The presence of compressive strain resulted in improvement in strength of YBCO superconductors from 200 to 223 MPa. The internal strains in Al2O3-SiC composites were observed to relax with temperature extrapolating to zero value at approximately 1350 C. DOE

N92-12757# Sandia National Labs., Albuquerque, NM.
CHARGE STATES OF DONOR-HYDROGEN PAIRS IN Si: A FRAGILE BALANCE
S. K. Estreicher, C. H. Seager, and R. A. Anderson 1991 7 p Presented at the 16th International Conference on Defects in Semiconductors, Bethlehem, PA, 22-26 Jul. 1991
(Contract DE-AC04-76DP-00789)
(DE91-018794; SAND-91-1861C; CONF-9107146-3) Avail: NTIS HC/MF A02

The debonding rates of H-passivated P and As in silicon have been observed to be very sensitive to the concentration of majority and minority charge carriers. A theoretical study of the stable and metastable configurations of the (P,H) (As,H) pairs in the 0 and +1 charge states has been carried out at the near-ab-initio Hartree-Fock level. These calculations show that the lowest-energy configuration in the 0 charge state is the highest-energy configuration in the +1 charge state and vice-versa. This bistability of donor-hydrogen pairs implies that H cannot remain in place upon change of charge state, whether 0 to +1 or +1 to 0. Quantitative differences between the P and the As cases are qualitatively consistent with the observed differences in the temperature dependence of the debonding rates of (P,H) and (As,H). DOE

N92-12758# Oak Ridge National Lab., TN.
MAGNETIZATION STUDIES OF IRRADIATION MODIFIED SINGLE CRYSTAL Y1Ba2Cu3O7 SUPERCONDUCTORS: FLUX CREEP AND ANNEALING EFFECTS

J. R. Thompson, Ren Sun Yang, D. K. Christen, and H. R. Kerchner 1991 27 p Presented at the NATO Advanced Study Institute on Physics and Materials Science of High-Temperature Superconductors, Corfu Island, Greece, 18-31 Aug. 1991 Prepared in cooperation with Tennessee Univ., Knoxville
(Contract DE-AC05-84OR-21400)
(DE91-018858; CONF-910860-2) Avail: NTIS HC/MF A03

Measurements of the static magnetization of a superconductor provide an informative and facile method to understand many of its properties. The objective of this paper is to analyze several features of the high temperature superconductor Y1Ba2Cu3O7, hereafter referred to as YBCO. Of particular interest are the critical current density, which is related to irreversibility in the magnetization, and the effects of different types of defects in the material. These defects tend to pin or immobilize the quantized magnetic field lines (vortices) that permeate a Type-2 superconductor when it is immersed in a magnetic field H that is greater than the lower critical field H(sub cl). This process is dramatically affected by the presence of giant flux creep, a pervasive feature of high temperature superconductors. In this work, high quality single crystals of Y1Ba2Cu3O7, with (Tc) values greater than 90 K, were studied in three forms: (1) as synthesized, with relatively low critical current density J(sub c); (2) after irradiation with light ions (protons with 3 MeV energy), that created point defects and increased J(sub c) considerably; and (3) after irradiation with heavy ions (Sn-ions with 580 MeV energy) that created linear pinning defects parallel to the ion paths. We discuss first the irreversible vortex-state magnetization, the related critical current density J(sub c), relaxation of the magnetization with time (flux creep), the dependence of pinning energy on the magnitude of current density J, long-term studies of magnetic relaxation and their relation to collective pinning models, and finally treat flux creep annealing experiments. Where possible, we compare and contrast the results achieved with point-like and linear flux pinning geometries. DOE

N92-12759# Sandia National Labs., Albuquerque, NM.
SOLID STATE RADIOLUMINESCENT SOURCES USING TRITIUM-LOADED ZEOLITES
J. T. Gill, D. B. Hawkins (Alaska Univ., Fairbanks.), and C. L. Renschler 1991 9 p Presented at the 4th Topical Meeting on Tritium Technology in Fission, Fusion, and Isotopic Applications, Albuquerque, NM, 30 Sep. - 4 Oct. 1991
(Contracts DE-AC04-76DP-00789; DE-AC04-88DP-43495)
(DE91-019061; SAND-91-2014C; CONF-910920-3) Avail: NTIS HC/MF A02

Zeolite-based tritium lamps are a possible alternative to traditional tritium gas tube light sources. Rare earth luminescing centers may be ion-exchanged into zeolite matrices. Close proximity of tritium atoms to the rare earths can be provided by highly tritiated water sorbed within the pore structure of the zeolite aluminosilicate matrix. Zeolites are optically clear and radiation stable. Light outputs from tritium-loaded zeolites are shown here to exceed 2 micro-W/sq cm, with good stability. Procedures for obtaining light sources are presented and results are discussed. The possible use of these luminescent materials as process monitors for zeolite absorption columns in tritium service is also discussed. DOE

N92-12760# China Nuclear Information Centre, Beijing.
THE FLUX JUMPS IN HIGH Tc Bi(1.7)Pb(0.3)Sr2 Ca2Cu3O(y) BULK SUPERCONDUCTOR
Xiaowen Cao and Sunli Huang (Academia Sinica, Hefei, China) Nov. 1989 7 p In CHINESE; ENGLISH summary
(DE91-628641; CNIC-00325; ASIPP-0011) Avail: NTIS HC/MF A02

There were giant flux jumps in high T sub c Bi(1.7)Pb(0.3)Sr2Ca2Cu3O(v) bulk superconductor. The relaxation time, tau, decreased with both the increase of magnetic field and the rise of temperature. The maximum tau was about 40 min. The average -dM/dt increased with both the increase of magnetic field and the rise of temperature. The minimum average -dM/dt was about 4.1 x 10(exp -2) G/min. The flux jump weakened with time. It was dependent on the decrease of gradient of magnetic flux density dn/dx in the sample. DOE

N92-12761# China Nuclear Information Centre, Beijing.
FORMING PROCESS OF 110 K HIGH-Tc PHASE IN Bi-Pb-Sr-Ca-Cu-O SYSTEM
Yugui Wang, Nanlin Wang, Xinping Jiao, Jinsong Wang, and Guchang Han (Academia Sinica, Hefei, China) Dec. 1989 9 p In CHINESE; ENGLISH summary
(DE91-628642; CNIC-00327; ASIPP-0013) Avail: NTIS HC/MF A02

The effect of heat treatment on the forming process of the high T sub c phase in the cast-annealing samples has been discussed. Experiments show that the high T sub c phase is formed based on the low T sub c phase. Adding Pb to Bi-Sr-Ca-Cu-O system can increase the forming rate and proportion of the high T sub c phase. X ray powder diffraction indicates that some samples contain mostly the high T sub c phase. EDAX analyses suggest that Pb cations substitute partially for Sr cations rather than Bi cation in the superconducting grains. DOE

N92-12762# China Nuclear Information Centre, Beijing.
EFFECT OF COOLING RATE ON THE TRANSITION TEMPERATURE IN Bi-Pb-Sr-Ca-Cu-O SYSTEM
Yugui Wang, Jinsong Wang, Nanlin Wang, Xinping Jiao, Guchang Han (Academia Sinica, Hefei, China), Zhaojia Chen, Keqin Wang, and Xiaoguang Wu Dec. 1989 8 p In CHINESE; ENGLISH summary
(DE91-628643; CNIC-00330; ASIPP-0016) Avail: NTIS HC/MF A02

The resistance and a.c. susceptibility measurement show that cooling rate of the cast-annealing samples in heat treatment process has some effect on the 110 K superconducting phase in Bi-Pb-Sr-Ca-Cu-O system. Rapid quenching of the sample in air from 845 C causes oxygen deficiency in lattice and brings about a trifling change of unit cell size along c-axis direction. The d.c. magnetization and specific heat anomaly Delta c measurements demostrate that fast cooling rate can reduce the transition temperature of high T sub c phase and the lower critical field, and weaken the pinning forces for vertex lines. The peak value of specific heat anomaly of the sample with nominal composition of Bi(1.7)Pb(0.3)Sr2Ca2Cu(4.5)O(v) is still small in comparison with YBa2Cu3O7. From the magnetization curve the authors estimate that the superconducting volume fraction is about 20 pct. DOE

N92-12763# Los Alamos National Lab., NM. Computer Research Group.
DERIVATION OF THE HIGH FIELD SEMICONDUCTOR EQUATIONS
P. S. Hagan, R. W. Cox, and B. A. Wagner (Arizona Univ., Tucson.) 1991 28 p Presented at the 1991 IMA Semiconductor Workshop, Minneapolis, MN, 15 Jul. - 9 Aug. 1991
(Contract W-7405-eng-36)
(DE92-000249; LA-UR-91-2951; CONF-9107176-1) Avail: NTIS HC/MF A03

Electron and hole densities evolve in x-z phase space according to Boltzmann equations. When the mean free path of the particles is short and electric force on the particles is weak, a well-known expansion can be used to solve the Boltzmann equation. This asymptotic solution shows that the spatial density of electrons and holes evolves according to diffusion-drift equations. As devices become smaller, electric fields become stronger, which renders the basic semiconductor equations increasingly inaccurate. To remedy this problem, we use singular perturbation techniques to obtain a new asymptotic expansion for the Boltzmann equation. Like the Hilbert expansion, the new expansion requires the mean free path to be short compared to all macroscopic length scales. However, it does not require the electric forces to be weak. The new expansion shows that spatial densities obey diffusion-drift equations as before, but the diffusivity D and mobility (mu) turn out to be nonlinear functions of the electric field. In particular, our analysis determines the field-dependent mobilities, mu(E), and

diffusivities, D(E), directly from the scattering operator. By carrying out this asymptotic expansion to higher order, we obtain the high frequency corrections to the drift velocity and diffusivity, and also the corrections due to gradients in the electric field. Remarkably, we find that Einsteins's relation is still satisfied, even with these corrections. The new diffusion-drift equations, together with Poissons' equation for the electric field, form the high-field semiconductor equations, which can be expected to be accurate regardless of the strength of the electric fields within the semiconductor. In addition, our analysis determines the entire momentum distribution of the particles, so we derive a very accurate first moment model for semiconductors by substituting the asymptotically-correct distribution back into the Boltzmann equation and taking moments. DOE

N92-12764# Los Alamos National Lab., NM.
OPTICAL PROPERTIES OF MX CHAIN MATERIALS: AN EXTENDED PEIERLS-HUBBARD MODEL
A. R. Bishop, I. Batistic, J. T. Gammel, and A. Saxena 1991 12 p Presented at the Optical Probes of Conjugated Polymers Conference, Snowbird, UT, 19-22 Aug. 1991
(Contract W-7405-eng-36)
(DE92-000314; LA-UR-91-2862; CONF-9108168-1) Avail: NTIS HC/MF A03

We describe theoretical modeling of both pure (MX) and mixed-halide (MX(x)X(prime)(1-x)) halogen (X)-bridged transition metal (M) linear chain complexes in terms of an extended Peierls-Hubbard, tight-binding Hamiltonian with 3/4-filling of two-bands. Both inter- and intra-site electron-phonon coupling are included. Electronic (optical absorption), lattice dynamic (IR, Raman) and spin (ESR) signatures are obtained for the ground states, localized excited states produced by impurities, doping or photo-excitation -- excitons, polarons, bipolarons, solitons; and the edge states (which occur in mixed-halide crystals, e.g. PtCl(x)Br(1-x)). Adiabatic molecular dynamics is used to explore photodecay channels in pure and impure systems for ground states as well as in the presence of pre-existing polaronic states. DOE

N92-12765# Oak Ridge National Lab., TN.
PROPERTIES OF EPITAXIAL YBa2Cu3O(7-DELTA)-BASED SUPERCONDUCTING SUPERLATTICES
D. P. Norton, D. H. Lowndes, Z. Y. Zheng, R. Feenstra, and Shen Zhu (Tennessee Univ., Knoxville.) Sep. 1991 12 p Presented at the 5th Annual Conference on Superconductivity and Applications, Buffalo, NY, 24-26 Sep. 1991
(Contract DE-AC05-84OR-21400)
(DE92-000423; CONF-9109102-1) Avail: NTIS HC/MF A03

Epitaxial YBa2Cu3O(7-delta) superconducting superlattices have been fabricated using pulsed laser deposition in which c-axis oriented YBa2Cu3O(7-delta) layers as thin as one unit cell thick are separated by relatively thick PrBa2Cu3O(7-delta) based barrier layers. The superlattice Tc (R=0) decreases rapidly with increasing barrier layer thickness, but then saturates at a finite Tc for YBa2Cu3O(7-delta) layers as thin as a single c-axis unit cell. The superconducting properties of YBa2Cu3O(7-delta)-based superlattices are shown to depend strongly on the electronic properties of the barrier layers. The resistive transition width decreases significantly as the hole carrier density in the barrier layers is increased. However, Tc (onset) does not change, contrary to predictions of hole filling models. Theoretical analyses suggest that the broadening of the resistive transition for the thinnest YBa2Cu3O(7-delta) layers is most likely due to a crossover to 2D resistive behavior involving thermally-generated vortices. Scanning tunneling microscopy reveals that epitaxial YBa2Cu3O(7-delta) thin films grow unit cell-by-unit cell, by a terraced-island growth mode. This terraced microstructure explains the steps found in ultrathin YBa2Cu3O(7-delta) layers in these superlattices. These steps may act as superconducting weak links, providing support for 2D Josephson-coupled-array models of superconducting superlattices. DOE

N92-12766# Oak Ridge National Lab., TN.
LASER ABLATION SYNTHESIS AND PROPERTIES OF EPITAXIAL YBa2Cu3O(7-DELTA) / PrBa2Cu3O(7-DELTA) SUPERCONDUCTING SUPERLATTICES
D. H. Lowndes, D. P. Norton, X. Y. Zheng, and Shen Zhu (Tennessee Univ., Knoxville.) Sep. 1991 17 p Presented at the European Materials Research Society (E-MRS) Summer School on Laser Ablation of Electronic Materials: Basic Mechanisms and Applications, Carcans-Maubuisson (France), 16-19 Sep. 1991
(Contract DE-AC05-84OR-21400)
(DE92-000447; CONF-9109286-1) Avail: NTIS HC/MF A03

Pulsed laser ablation has been used to fabricate epitaxial superlattices in which c-axis-perpendicular YBa2Cu3O(7-delta) (YBCO) layers as thin as a single unit cell are separated by semiconducting PrBa2Cu3O(7-delta) (PBCO) layers. The superlattice Tc (R=0) decreases rapidly with increasing PBCO thickness, but then saturates at Tc approximately 19 K, 54 K, 71 K, or 80 K, for structures containing isolated, 1-,2-,3-, or 4-cell-thick YBCO layers, respectively. Recent theoretical analyses suggest that the decrease of Tc and broadening of the resistive transition for the thinnest YBCO layers is most likely due either to a crossover from 3D to 2D resistive behavior, or to hole-filling in the YBCO layers caused by electron transfer from the PBCO. We find that the resistance in the superconducting transition region scales with temperature as expected for dissipation by characteristically 2D (vortex) excitations. Departures from the universal resistance behavior expected for a 2D Ginzburg-Landau Coulomb gas, as the YBCO thickness is increased or the PBCO thickness is decreased, can be attributed to the onset of phase coupling between the YBCO layers. Thus, the experiments show that YBCO's effective anisotropy can be greatly increased by separating very thin YBCO layers by thicker PBCO layers in superlattice structures. As a result, characteristic 2D dissipation can be observed over a greatly expanded temperature range, relative to both thicker-film and single-crystal YBCO specimens. Experiments also were carried out using two additional isostructural sets of superlattices in which the PBCO layers were replaced by more conductive Y- or Ca-doped PBCO layers, in order to alter any electron transfer from PBCO to YBCO. DOE

N92-12720# Technische Univ., Eindhoven (Netherlands). Dept. of Physics.
PHOTON ENHANCED CHEMICAL VAPOR DEPOSITION OF CARBON BASED THIN FILMS FROM TOLUENE VAPOR
Arnold Theodoor Mari Wilbers, J. J. Beulens, and D. C. Schram *In its* A Wall Stabilized Arc as a Light Source for Spectroscopic Techniques 1991 p 101-113 (For primary document see N92-12715 03-75)
Avail: NTIS HC/MF A08

N92-12721# Technische Univ., Eindhoven (Netherlands). Dept. of Physics.
THE a-Si:H FILMS PRODUCED BY AN EXPANDING ARGON-SILANE PLASMA INVESTIGATED WITH SPECTROSCOPIC INFRARED ELLIPSOMETRY
Arnold Theodoor Mari Wilbers, G. J. Meeusen, M. Haverlag, G. M. W. Kroesen, D. C. Schram, and H. Kersten (Greifswald Univ., German D.R.) *In its* A Wall Stabilized Arc as Light Source for Spectroscopic Techniques 1991 p 115-144 Submitted for publication (For primary document see N92-12715 03-75)
Avail: NTIS HC/MF A08

77 THERMODYNAMICS AND STATISTICAL PHYSICS

Includes quantum mechanics; theoretical physics; and Bose and Fermi statistics.

For related information see also *25 Inorganic and Physical Chemistry* and *34 Fluid Mechanics and Heat Transfer.*

N92-12767# Brookhaven National Lab., Upton, NY.
SIMULTANEOUS DETERMINATION OF OPTICAL AND THERMODYNAMIC PROPERTIES OF AN EVAPORATING AQUEOUS SOLUTION DROPLET
I. N. Tang and H. R. Munkelwitz Apr. 1990 5 p Presented at the 3rd International Aerosol Conference, Kyoto (Japan), 24-27 Sep. 1990
(Contract DE-AC02-76CH-00016)
(DE90-010652; BNL-43549; CONF-9009136-1) Avail: NTIS HC/MF A01

Advances in the single-particle levitation technique have made it possible to investigate evaporation of an aqueous solution droplet under controlled humidity conditions. The technique involves the levitation of a charged micron-sized inorganic salt particle in a quadrupole cell, which can be evacuated to approximately 10(exp -7) torr and back filled with water vapor to a predetermined pressure at a fixed temperature. Water evaporation occurs as the cell is evacuated slowly through a precision leak valve. Droplet mass change is measured by the dc voltage needed to counterbalance gravity, whereas the droplet size is continuously monitored by the 90 degree angle laser light scattering. By fitting the light scattering data with Mie computations using appropriate refractive index and density estimates, it is possible to obtain these optical and thermodynamic properties over a wide concentration range from high dilution to high supersaturation. Such a wide concentration range can only be achieved with a suspended solution droplet. Results are presented for aqueous ammonium sulfate solution droplets. DOE

N92-12768 Politecnico di Milano (Italy). Dipt. di Elettronica.
SPECTRAL FACTORIZATION OF LINEAR PERIODIC SYSTEMS WITH APPLICATION TO THE OPTIMAL PREDICTION OF PERIODIC ARMA MODELS
Sergio Bittanti and Giuseppe DeNicolao (Consiglio Nazionale delle Ricerche, Milan, Italy) 1990 22 p Sponsored by MURST and CNR
(Rept-90-013; ETN-91-90234) Avail: Politecnico di Milano, Piazza Leonardo da Vinci 32, 20133 Milan, Italy

The spectral factorization and optical prediction of ARMA (Auto Regressive Moving Average) models with Periodic coefficients (PARMA models) are addressed. To this purpose, the notion of (state-space) periodic innovation representation of cyclostationary processes as well as the notion of minimum phase PARMA are introduced. Conditions under which a nonminimum phase PARMA admits a canonical minimum phase PARMA representation are given. It is shown that the prediction rule for mimimum phase PARMA's can be given a simple input/output form which generalizes the well known time invariant ARMA prediction formula. Conversely, in the nonminimum phase case, the solution of the prediction problem calls for the canonical representation of the original PARMA. ESA

N92-12769# IIT Research Inst., Bartlesville, OK. National Inst. for Petroleum and Energy Research.
THE THERMODYNAMIC PROPERTIES OF BENZOTHIAZOLE AND BENZOXAZOLE
W. V. Steele, R. D. Chirico, S. E. Knipmeyer, and A. Nguyen Aug. 1991 51 p
(Contract DE-FC22-83FE-60149)
(DE91-002250; NIPER-533) Avail: NTIS HC/MF A04

This research program, funded by the Department of Energy, Office of Fossil Energy, Advanced Extraction and Process Technology, provides accurate experimental thermochemical and thermophysical properties for key organic diheteroatom-containing compounds present in heavy petroleum feedstocks, and applies the experimental information to thermodynamic analyses of key hydrodesulfurization, hydrodenitrogenation, and hydrodeoxygenation reaction networks. Thermodynamic analyses, based on accurate information, provide insights for the design of cost-effective methods of heteroatom removal. The results reported here, and in a companion report to be completed, will point the way to the development of new methods of heteroatom removal from heavy petroleum. Measurements leading to the calculation of the ideal-gas thermodynamic properties are reported for benzothiazole and benzoxazole. Experimental methods included combustion calorimetry, adiabatic heat-capacity calorimetry, comparative ebulliometry, inclinded-piston gauge manometry, and differential-scanning calorimetry (d.s.c). Critical property estimates are made for both compounds. Entropies, enthalpies, and Gibbs energies of formation were derived for the ideal gas for both compounds for selected temperatures between 280 K and near 650 K. The Gibbs energies of formation will be used in a subsequent report in thermodynamic calculations to study the reaction pathways for the removal of the heteratoms by hydrogenolysis. The results obtained in this research are compared with values present in the literature. The failure of a previous adiabatic heat capacity study to see the phase transition in benzothiazole is noted. Literature vibrational frequency assignments were used to calculate ideal gas entropies in the temperature range reported here for both compounds. Resulting large deviations show the need for a revision of those assignments. DOE

N92-12770# Los Alamos National Lab., NM.
PHYSICAL INTERPRETATION OF SUPERCOHERENT STATES AND THEIR ASSOCIATED GRASSMANN NUMBERS
M. M. Nieto 1991 5 p Presented at the Meeting on the Foundation of Quantum Mechanics, Santa Fe, NM, 27-31 May 1991
(Contract W-7405-eng-36)
(DE92-000187; LA-UR-91-3063; CONF-9105251-2) Avail: NTIS HC/MF A01

A physical interpretation of supercoherent states is suggested. It is based upon the observation that an ordinary coherent state is an eigenstate of a specific mode of the radiation field. A supercoherent state is viewed as a photino coherently combined with photons of the same mode. An interpretation of the associated Grassmann-valued numbers of the state is also discussed. DOE

N92-12771# Los Alamos National Lab., NM.
MONTE CARLO APPROACHES TO EFFECTIVE FIELD THEORIES
J. Carlson and K. E. Schmidt (Arizona State Univ., Tempe.) 1991 10 p Presented at the Recent Progress in Many-Body Theories, Minneapolis, MN, 26-31 Aug. 1991
(Contract W-7405-eng-36)
(DE92-000198; LA-UR-91-3023; CONF-9108142-3) Avail: NTIS HC/MF A02

In this paper, we explore the application of continuum Monte Carlo methods to effective field theory models. Effective field theories, in this context, are those in which a Fock space decomposition of the state is useful. These problems arise both in nuclear and condensed matter physics. In nuclear physics, much work has been done on effective field theories of mesons and baryons. While the theories are not fundamental, they should be able to describe nuclear properties at low energy and momentum scales. After describing the methods, we solve two simple scalar field theory problems; the polaron and two nucleons interacting through scalar meson exchange. The methods presented here are rather straightforward extensions of methods used to solve quantum mechanics problems. Monte Carlo methods are used to avoid the truncation inherent in a Tamm-Dancoff approach and its associated difficulties. Nevertheless, the methods will be most valuable when the Fock space decomposition of the states is useful. Hence, while they are not intended for ab initio studies of QCD, they may prove valuable in studies of light nuclei, or for systems of interacting electrons and phonons. In these problems, a Fock space decomposition can be used to reduce the number of degrees of freedom and to retain the rotational symmetries

exactly. The problems we address here are comparatively simple, but offer useful initial tests of the method. We present results for the polaron and two non-relativistic nucleons interacting through scalar meson exchange. In each case, it is possible to integrate out the boson degrees of freedom exactly, and obtain a retarded form of the action that depends only upon the fermion paths. Here we keep the explicit bosons, though, since we would like to retain information about the boson components of the states and it will be necessary to keep these components in order to treat non-scalar of interacting bosonic fields. DOE

80 SOCIAL SCIENCES (GENERAL)

Includes educational matters.

N92-12772# Technische Univ., Eindhoven (Netherlands).
MODULAR ORGANIZATION OF DOMESTIC CARE IN WEERT (NETHERLANDS) Ph.D. Thesis [MODULAR ORGANISEREN BIJ DE GEZINSZORG TE WEERT]
Gerardus Jacques Joh Post 1991 187 p In DUTCH
(ISBN-90-6757-045-1; ETN-91-90141) Copyright Avail: NTIS HC/MF A09

The structuring of a non profit organization in a dynamic and complex environment was studied. The main contribution to its approach is the unit management concept. Unit management implicates the development within a large organization of relatively small and independent units run by internal entrepreneurs. Unit management in non profit organizations is restricted by economics of scale and technical process characteristics, but the interdependencies between units are stronger than in industrial organizations. This results in a form of unit management where units are more operationally independent, but less strategically autonomous. Therefore it is concluded that the entreapreneurial approach is also applicable in non profit organizations, whereas the automomy of these units is restricted. ESA

N92-12773# National Defence Research Establishment, Umea (Sweden). Dept. of NBC-Defence.
THE TOTAL DEFENCE RADIATION PROTECTION ORGANIZATION. A STUDY OF ITS CAPABILITY
Hans Tovedal and Thomas Ulvsand May 1991 71 p In SWEDISH; ENGLISH summary
(FOA-C-40285-4.3; ISSN-0347-2124; ETN-91-90282) Avail: NTIS HC/MF A04; National Defence Research Establishment, S-901 82 Umeaa, Sweden, HC 100 Swedish crowns

The total defence radiation protection organization was investigated regarding its capability to deal with different radiation situations. Two quite different scenarios were used to test the main functions of the organization. One was a small, surface nuclear explosion in the south of Sweden and the other was a nuclear weapons attack in Norway, with subsequent radioactive fall out in Sweden. The conclusion is that some parts of the organization are funtioning very well, while others are not, and it is recommended that a certain reconsideration of the latter should be carried out. ESA

N92-12543# Acquired Intelligence, Inc., Victoria (British Columbia).
A KNOWLEDGE-BASED INTELLIGENT TUTORING SYSTEM: ACQUIRE (TM)-ITS
B. A. Schaefer, R. Side, R. Wagstaff, O. Magusin, and I. R. Morrison *In* AGARD, Machine Intelligence for Aerospace Electronic Systems Sep. 1991 6 p (For primary document see N92-12517 03-63)
Copyright Avail: NTIS HC/MF A14; Non-NATO Nationals requests available only from AGARD/Scientific Publications Executive

81 ADMINISTRATION AND MANAGEMENT

Includes management planning and research.

N92-12774# Oak Ridge National Lab., TN.
DECISION SUPPORT SYSTEM DEVELOPMENT USING A MIGRATION APPROACH
D. G. MacGregor (MacGregor-Bates, Inc., Eugene, OR.), B. Tonn, and R. Goeltz Sep. 1991 15 p Presented at the Symposium on Expert System Applications for the Electric Power Industry, Boston, MA, 9-11 Sep. 1991
(Contract DE-AC05-84OR-21400)
(DE91-018860; CONF-9109121-3) Avail: NTIS HC/MF A03

Virtually all organizations in the utility industry rely on some form of computerized decision support to assist in the management of operations and maintenance. As decision support needs evolve, new technologies are introduced and old technologies are updated, when possible and cost effective. Unfortunately, new designs are often superior to old ones, and retrofitting does not prove feasible, resulting in many pieces of stand-alone equipment that are not integrated into a common decision support framework. This paper develops a model for integrating decision support systems of diverse vintage into a common workstation, using a migration approach. The model is applied in the design and development of an integrated workstation to support operations and maintenance of a microwave communication system for power system monitoring and control. The system, called CAP for Computerized Alarm Processing, provides an integration of decision support functions previously performed manually, integrates dispersed databases, and provides both expert system and statistical analysis capabilities. The fielded system is currently in operation at the Bonneville Power Authority's Dittmer Control Center. The implications of the migration approach for upgrading power system decision support are discussed. DOE

N92-12775 Politecnico di Milano (Italy). Dipt. di Economia e Produzione.
CONTROL MECHANISMS IN ITALIAN BUSINESS GROUPS
Fransesco Brioschi, Luigi Buzzacchi, and Massimo G. Colombo (Consiglio Nazionale delle Ricerche, Milan, Italy) Dec. 1990 17 p Presented at the Conference on Les Groupes Industriels et Financiers et l'Integration Europeenne, Toulouse, France, 1989
(Rept-90-014; ETN-91-90252) Avail: Politecnico di Milano, Piazza Leonardo da Vinci 32, 20133 Milan, Italy

The analysis of control mechanisms in business groups is addressed with special reference to the Italian case. The definition of business groups and remarks about their organization are given. The mechanisms for separating ownership from control in business groups in general and in Italian business groups are discussed. ESA

N92-12776 Politecnico di Milano (Italy). Dipt. di Economia e Produzione.
THE STOCK EXCHANGE MARKET AND COMPANY GROUPS [IL MERCATO DI BORSA ED I GRUPPI DI IMPRESE]
Francesco Brioschi, Luigi Buzzacchi, and Massimo G. Colombo Dec. 1990 44 p In ITALIAN
(Rept-90-015; ETN-91-90253) Avail: Politecnico di Milano, Piazza Leonardo da Vinci 32, 20133 Milan, Italy

The impact of group structure on the values (vote and investment segments) of financial ownership of a company is analyzed. Relevant literature to this subject is reviewed. The subject of modifications of measures is addressed. The necessity of modifying relations to safeguard the functioning of the market and its interests and investments is considered. ESA

N92-12777 Politecnico di Milano (Italy). Dipt. di Economia e Produzione.
THE ORGANIZATION OF AN OPTIONS MARKET: CASE OF THE EUROPEAN OPTIONS MARKET [L'ORGANIZZAZIONE DI UN MERCATO DI OPZIONI: IL CASO DELL'EUROPEAN OPTIONS MARKET]

Luigi Buzzacchi Dec. 1990 79 p In ITALIAN
(Rept-90-016; ETN-91-90254) Avail: Politecnico di Milano, Piazza Leonardo da Vinci 32, 20133 Milan, Italy

The detailed analysis of the experiences of the Dutch options market, the oldest traditional European market, is addressed. Strength and weaknesses are studied with particular attention to its integration process with other national financial markets and analogous foreign markets. The aim is to provide a useful knowledge base for debate on Italian development in the discussion of an options market organization. ESA

N92-12778# Aerospatiale, Cannes (France).
SOLAR ARRAY MANAGEMENT GUIDE
J. C. Vermalle and M. Roussel (Centre National d'Etudes Spatiales, Toulouse, France) 26 Mar. 1991 9 p
(Rept-911-440-114; ETN-91-90274) Avail: NTIS HC/MF A02

A solar management guide was validated, which is aimed at controlling project progress so as to prevent untimely events. The management guide proposed is based on the idea that anticipation is the clue to solving problems. Application of this tenet is achieved by steps: ensuring good understanding of requirements; identification of potential risks; heritage analysis and status; definition of verifications taking into account risks and heritage; simulation of activities; implementation of activities; survey of project progress versus to simulation; final examination to draw lessons. The innovation in this management guide comes from organization and systematization of step investigation, which are generaly followed intuitively. This logic is applicable to all space products, from part of equipment up to system level. ESA

82 DOCUMENTATION AND INFORMATION SCIENCE

Includes information management; information storage and retrieval technology; technical writing; graphic arts; and micrography.

For computer documentation see *61 Computer Programming and Software.*

N92-12779 Edinburgh Univ. (Scotland).
INFORMATION AND INFORMATION PROCESSING Ph.D. Thesis
Nick Chater 1989 201 p
Avail: Univ. Microfilms Order No. BRD-92840

Despite its name, information processing, psychology has become gradually divorced from the mathematical theory of information. However, Dretske (1981) has proposed that information theoretic ideas can be extended to generate notions of information content and semantic content which may be applied to the analysis of perceptual and cognitive activity, and which found a theory of propositional attitudes. I shall argue Dretske's account is only tenuously related to its supposed information-theoretic basis, and that a misunderstanding of the relationship between the two has generated a number of crucial flaws in Dretske's analysis. A revised account, formalized in terms of propositional logic, is presented. The revised analysis embodies the claim that information properties cannot be ascribed absolutely, but are necessarily relative to the information idealization chosen. I argue that Dretske's failure to recognize idealization relativity has serious ramifications for the application of informational ideas to information processing in general, and mental activity in particular. For instance, by varying the informational idealization adopted, the distinction between perception and cognition can be manipulated almost arbitrarily. Building on Dretske's analog-digital distinction, I propose that information processing may quite generally be seen as a matter of transforming information from unuseable (inexplicit) form, to usable (explicit) form. Two important difficulties with applying informational ideas to the analysis of propositional attitudes-Misrepresentation and Detectability-are addressed. Dissert. Abstr.

N92-12780 Oxford Univ. (England).
STRUCTURAL AND OPTICAL CHARACTERISATION OF LANGMUIR-BLODGETT FILMS FOR DATA STORAGE APPLICATIONS Ph.D. Thesis
David Heard 1990 224 p
Avail: Univ. Microfilms Order No. BRD-92648

The systematic development of a number of near infrared absorbing dye systems for deposition by this process is described. The ability to form a thin yet perfectly uniform and highly absorbing coating which absorbs strongly in the near infrared was demonstrated. Ablative recording was achieved in these films, and competitive sensitivities to marking and contrast ratios were obtained. Optical microscopy and transmission electron diffraction were used together with other techniques to fully characterize these materials. Information on the chemical structure-property relationship of Langmuir-Blodget film materials was acquired. Transmission electron diffraction was developed to enable the routine characterization of Langmuir-Blodgett films. A pseudo-hexagonal packing arrangement was shown to exist in the alkanoic acid class of molecules and the structure of the dye materials developed for optical storage was also determined. The ability to successfully deposit uniform coatings of these dyes has opened up many other potential applications such as optical filters, optical security devices, nonlinear applications, and pyroelectric thermal imaging devices. Dissert. Abstr.

N92-12781*# Research Inst. for Advanced Computer Science, Moffett Field, CA.
A DISTRIBUTED AGENT ARCHITECTURE FOR REAL-TIME KNOWLEDGE-BASED SYSTEMS: REAL-TIME EXPERT SYSTEMS PROJECT, PHASE 1 Final Report
S. Daniel Lee (Inference Corp., Los Angeles, CA.) May 1990 58 p
(Contract NCC9-16; RICIS Proj. SE-19)
(NASA-CR-188947; NAS 1.26:188947) Avail: NTIS HC/MF A04 CSCL 05B

We propose a distributed agent architecture (DAA) that can support a variety of paradigms based on both traditional real-time computing and artificial intelligence. DAA consists of distributed agents that are classified into two categories: reactive and cognitive. Reactive agents can be implemented directly in Ada to meet hard real-time requirements and be deployed on on-board embedded processors. A traditional real-time computing methodology under consideration is the rate monotonic theory that can guarantee schedulability based on analytical methods. AI techniques under consideration for reactive agents are approximate or anytime reasoning that can be implemented using Bayesian belief networks as in Guardian. Cognitive agents are traditional expert systems that can be implemented in ART-Ada to meet soft real-time requirements. During the initial design of cognitive agents, it is critical to consider the migration path that would allow initial deployment on ground-based workstations with eventual deployment on on-board processors. ART-Ada technology enables this migration while Lisp-based technologies make it difficult if not impossible. In addition to reactive and cognitive agents, a meta-level agent would be needed to coordinate multiple agents and to provide meta-level control. Author

N92-12782# Oak Ridge National Lab., TN.
PRACTICAL IMPLICATIONS OF THEORIES OF UNCERTAINTY FOR UNCERTAINTY ELICITATION
B. Tonn and D. G. MacGregor (MacGregor-Bates, Inc., Eugene, OR.) 1991 15 p Presented at the Symposium on Expert System Applications for the Electric Power Industry, Boston, MA, 9-11 Sep. 1991
(Contract DE-AC05-84OR-21400)
(DE91-017949; CONF-9109121-2) Avail: NTIS HC/MF A03

One of the most difficult aspects of knowledge engineering for knowledge-based systems development is the elicitation of uncertainty from experts. Though large numbers of articles and texts have been written on the topic of representing uncertainty in expert systems, much less advice and guidance is available on how to structure the uncertainty elicitation process. An overview

is presented of the problems associated with eliciting uncertainty as applied to knowledge engineering, including basic approaches for probability assessment and the biases that result from different assessment methods, and an analysis is presented of the problems associated with eliciting the uncertainty measures needed for the application of Dempster-Shafter Theory (DST). DOE

N92-12783# National Research Council of Canada, Ottawa (Ontario). Div. of Electrical Engineering.
AN OVERVIEW OF REALTIME EXPERT SYSTEMS
A. C. Diaz Apr. 1990 94 p
(NRC-31759; NRC-ERA-380; CTN-91-60264) Avail: NTIS HC/MF A04

This report presents an overview of existing realtime expert systems. These are expert systems that, among other things, interface directly with the process environment and its sensors and actuators, must perform under some time constraint, and must do multiple tasks. This report describes issues that must be handled by such expert systems, identifies components required to resolve these issues, and describes the approaches taken by current realtime expert systems to implement each component. It also takes several examples of realtime expert systems and describes their features, status, and future directions. Issues reviewed include the following: (1) responsiveness to time constraints; (2) the quality of the domain knowledge; (3) memory management in continuous operation; (4) handling and prioritizing of asynchronous events; (5) efficient management of limited resources; (6) creation and management of large knowledge bases; (7) verification of the reliability of input data and handling of uncertainty; (8) dynamism and nonmonotonicity - truth and consistency maintenance, adjustment of assumptions, decisions and conclusions in light of new evidence; (9) reasoning about the past, present, and possible futures; (10) integration of conventional numerical computation and artificial intelligence techniques; and (11) interface with the external environment. CISTI

N92-12784*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
CONTENTS OF THE JPL DISTRIBUTED ACTIVE ARCHIVE CENTER (DAAC) ARCHIVE, VERSION 2-91
Elizabeth A. Smith, ed. and Ruby A. Lassanyi, ed. 1 Feb. 1991 28 p Revised
(Contract NAS7-918)
(NASA-CR-189027; JPL-Publ-90-49-Rev-1; NAS 1.26:189027)
Avail: NTIS HC/MF A03 CSCL 05B

The Distributed Active Archive Center (DAAC) archive at the Jet Propulsion Laboratory (JPL) includes satellite data sets for the ocean sciences and global change research to facilitate multidisciplinary use of satellite ocean data. Parameters include sea surface height, surface wind vector, sea surface temperature, atmospheric liquid water, and surface pigment concentration. The Jet Propulsion Laboratory DAAC is an element of the Earth Observing System Data and Information System (EOSDIS) and will be the United States distribution site for the Ocean Topography Experiment (TOPEX)/POSEIDON data and metadata. Author

N92-12785# California Univ., Berkeley. Lawrence Berkeley Lab. Data Management Group.
DATA MANAGEMENT IN HETEROGENEOUS ENVIRONMENTS AND ITS IMPLICATIONS TO CEDR
Victor M. Markowitz 27 Oct. 1990 28 p
(Contract DE-AC03-76SF-00098)
(DE92-000651; LBL-29576) Avail: NTIS HC/MF A03

We investigate in this report the issue of data management across multiple pre-existing databases characterized by various degrees of heterogeneity. Different approaches to the problem of data management in heterogeneous environments are reviewed and their advantages and disadvantages are discussed. We examine in some detail the problem of schema integration involved in these approaches. We illustrate different aspects of data management in heterogeneous environments with examples from the Comprehensive Epidemiological Data Resource (CEDR) project, and conclude the report with recommendations for CEDR. These recommendations are summarized in this paper. DOE

N92-12786*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, OH.
BIBLIOGRAPHY OF LEWIS RESEARCH CENTER TECHNICAL PUBLICATIONS ANNOUNCED IN 1990
Aug. 1991 437 p
(NASA-TM-103753; E-6007; NAS 1.15:103753) Avail: NTIS HC/MF A17 CSCL 05B

This compilation of abstracts describes and indexes the technical reporting that resulted from the scientific and engineering work performed and managed by the Lewis Research Center in 1990. All the publications were announced in the 1990 issues of STAR (Scientific and Technical Aerospace Reports) and/or IAA (International Aerospace Abstracts). Included are research reports, journal articles, conference presentations, patents and patent applications, and theses. Author

N92-12426*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
DATA COMPRESSION: THE END-TO-END INFORMATION SYSTEMS PERSPECTIVE FOR NASA SPACE SCIENCE MISSIONS
Wallace Tai *In* NASA. Goddard Space Flight Center, Space and Earth Science Data Compression Workshop Nov. 1991 p 5-12 (For primary document see N92-12425 03-59)
Avail: NTIS HC/MF A05 CSCL 05B

N92-12428*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
SAR DATA COMPRESSION: APPLICATION, REQUIREMENTS, AND DESIGNS
John C. Curlander and C. Y. Chang *In* NASA. Goddard Space Flight Center, Space and Earth Science Data Compression Workshop Nov. 1991 p 25-36 (For primary document see N92-12425 03-59)
Avail: NTIS HC/MF A05 CSCL 05B

N92-12429*# California Univ., Los Angeles. Inst. of Geophysics and Planetary Physics.
SCIENTIFIC REQUIREMENTS FOR SPACE SCIENCE DATA SYSTEMS
Raymond J. Walker *In* NASA. Goddard Space Flight Center, Space and Earth Science Data Compression Workshop Nov. 1991 p 37-50 (For primary document see N92-12425 03-59)
(Contracts JPL-958694; JPL-959026)
Avail: NTIS HC/MF A05 CSCL 05B

N92-12430*# Analex Corp., Cleveland, OH.
MICROGRAVITY SCIENCE REQUIREMENTS AND THE NEED FOR DATA COMPRESSION
William G. Hartz *In* NASA. Goddard Space Flight Center, Space and Earth Science Data Compression Workshop Nov. 1991 p 51-56 (For primary document see N92-12425 03-59)
Avail: NTIS HC/MF A05 CSCL 05B

N92-12431*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, MD.
DATA COMPRESSION FOR DATA ARCHIVAL, BROWSE OR QUICK-LOOK
Jeff Dozier (Universities Space Research Association, Greenbelt, MD.) and James C. Tilton *In its* Space and Earth Science Data Compression Workshop Nov. 1991 p 61-65 (For primary document see N92-12425 03-59)
Avail: NTIS HC/MF A05 CSCL 05B

N92-12432*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
DATA COMPRESSION FOR NEAR EARTH AND DEEP SPACE TO EARTH TRANSMISSION
Daniel E. Erickson *In* NASA. Goddard Space Flight Center, Space and Earth Science Data Compression Workshop Nov.

1991 p 67-72 (For primary document see N92-12425 03-59)
Avail: NTIS HC/MF A05 CSCL 05B

N92-12433*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, MD.
TECHNIQUES FOR CONTAINING ERROR PROPAGATION IN COMPRESSION/DECOMPRESSION SCHEMES
Ben Kobler *In its* Space and Earth Science Data Compression Workshop Nov. 1991 p 73-74 (For primary document see N92-12425 03-59)
Avail: NTIS HC/MF A05 CSCL 05B

N92-12506*# Houston Univ., TX.
INFORMATION LOGISTICS: A PRODUCTION-LINE APPROACH TO INFORMATION SERVICES
Dennis Adams and Chee-Seng Lee *In* Research Inst. for Advanced Computer Science, Networking as a Strategic Tool, 1991 1991 27 p (For primary document see N92-12497 03-62)
Avail: NTIS HC/MF A09 CSCL 05B

N92-12507*# Houston Univ., TX. Information Systems Research Center.
THE BUSINESS CASE FOR CONNECTIVITY
Dennis Adams and Rudy Hirschheim *In* Research Inst. for Advanced Computer Science, Networking as a Strategic Tool, 1991 1991 31 p (For primary document see N92-12497 03-62)
Avail: NTIS HC/MF A09 CSCL 05B

83 ECONOMICS AND COST ANALYSIS

Includes cost effectiveness studies.

N92-12787 Politecnico di Milano (Italy). Dipt. di Economia e Produzione.
HAS THE EUROPEAN MONETARY SYSTEM BEEN INSTRUMENTAL FOR THE CONVERGENCE OF INFLATION RATES IN EUROPE?
Abdur R. Chowdhury (Marquette Univ., Milwaukee, WI.) and Fabio Sdogati Sep. 1990 29 p Sponsored by CNR
(Rept-90-007; ETN-91-90251) Avail: Politecnico di Milano, Piazza Leonardo da Vinci 32, 20133 Milan, Italy

The issue of whether the European Monetary System (EMS) has contributed to lower mean and variance of inflation rates in its member countries is addressed. Both nominal exchange rate and domestic inflation rate changes are found to be responsible for the emergence of a purchasing power parity relationship among selected countries after the inception of the system. Though prices are sluggish to converge relative to exchange rates, the rate of convergence of inflation rates in the EMS countries in the sample is significantly different from zero, whereas it is not for those non EMS countries. The hypothesis of a positive role of EMS/ERM (Exchange Rate Mechanism) committments in bringing down inflation in member countries cannot be rejected. ESA

84 LAW, POLITICAL SCIENCE AND SPACE POLICY

Includes NASA appropriation hearings; aviation law; space law and policy; international law; international cooperation; and patent policy.

No abstracts in this category.

85 URBAN TECHNOLOGY AND TRANSPORTATION

Includes applications of space technology to urban problems; technology transfer; technology assessment; and surface and mass transportation.

For related information see also *03 Air Transportation and Safety, 16 Space Transportation,* and *44 Energy Production and Conversion.*

N92-12788# Argonne National Lab., IL.
FORECAST OF TRANSPORTATION ENERGY DEMAND THROUGH THE YEAR 2010
M. M. Mintz and A. D. Vyas Apr. 1991 101 p
(Contract W-31-109-eng-38)
(DE92-000222; ANL/ESD-9) Avail: NTIS HC/MF A06

Since 1979, the Center for Transportation Research (CTR) at Argonne National Laboratory (ANL) has produced baseline projections of U.S. transportation activity and energy demand. These projections, and the methodologies used to compute them, are documented in a series of reports and research papers. As the lastest in this series of projections, this report documents the assumptions, methodologies, and results of the most recent projection (termed ANL-90N) and compares those results with other forecasts from the current literature, as well as with the selection of earlier Argonne forecasts. This current forecast may be used as a baseline against which to analyze trends and evaluate existing and proposed energy conservation programs and as an illustration of how the Transportation Energy and Emission Modeling System (TEEMS) works. (TEEMS links disaggregate models to produce an aggregate forecast of transportation activity, energy use, and emissions). This report and the projections it contains were developed for the U.S. Department of Energy's Office of Transportation Technologies (OTT). The projections are not completely comprehensive. Time and modeling effort have been focused on the major energy consumers; automobiles, trucks, commercial aircraft, rail and waterborne freight carriers, and pipelines. Because buses, rail passengers services, and general aviation consume relatively little energy, they are projected in the aggregate, as other modes, and used primarily as scaling factors. These projections are also limited to direct energy consumption. Projections of indirect energy consumption, such as energy consumed in vehicle and equipment manufacturing, infrastructure, fuel refining, etc., were judged outside the scope of this effort. The document is organized into two complementary sections; one discussing passenger transportation modes, and the other discussing freight transportation modes. DOE

88 SPACE SCIENCES (GENERAL)

No abstracts in this category.

89 ASTRONOMY

Includes radio, gamma-ray, and infrared astronomy, and astrometry.

N92-12789 Leicester Univ. (England).
X-RAY OBSERVATIONS OF SS 433 AND THE QSO MR 2251-178 Ph.D. Thesis
Hongchao Pan 1989 249 p
Avail: Univ. Microfilms Order No. BRD-92090

The results are reported of the X ray observations of the galactic binary source SS 433 and the QSO MR 2251-178 made with the EXOSAT and GINGA X ray satellites. The EXOSAT and GINGA study of SS 433 shows that both the X ray intensity and spectrum of the binary vary over the periods of the 163 day jet

precession and the 13 day binary motion. The X ray luminosity of SS 433 is high at the phase corresponding to the maximum separation of the Doppler-shifted optical lines, and low when the jets become edge-on. An intensity decrease of up to 50 pct. can be seen in each energy channel while the source changes from high to low luminosity. Over the 13 day binary cycle, the X ray source is eclipsed by the companion star at the phase of the primary optical minimum. Five such events were observed by the EXOSAT and GINGA satellites at different phases of jet precession. The X ray spectrum of SS 433 consists of a thermal continuum and a Doppler energy shifted broad emission line. It is proved that the X ray emission of SS 433 originates in the jets and is thermal in nature. Variable X ray absorption and soft X ray excess are found in the X ray spectrum of MR 2251-178 with the EXOSAT observations. While there is an overall correlation between the ME(2 to 10 keV) and LE (0.1 to 2 keV) fluxes the pattern of variability can not be described by simple intensity, absorption or slope variations. It is shown that it is possible to explain all the observed features by adopting the warm absorber model in which the absorbing material is partially ionized by the flux of extreme ultraviolet and X ray photons from the central continuum source.
Dissert. Abstr.

N92-12790 Arizona Univ., Tucson.
INFRARED STUDIES OF STAR FORMATION IN THE RHO OPHIUCHI DARK CLOUD Ph.D. Thesis
Thomas Peter Greene 1991 161 p
Avail: Univ. Microfilms Order No. DA9123152

We present a near-infrared study of the stars forming in the rho Ophiuchi dark cloud and a mid- to far-infrared study of their environment. We determine that the total cloud luminosity matches that of the known embedded sources, ruling out the existence of a numerous but faint low mass embedded population. IRAS and optically thin (18)CO column density data are used to evaluate dust grain sizes and compositions via competing grain models. Radiative modeling shows that a standard power law distribution of graphite and silicate grains is responsible for IRAS 60 and 100 mm band emissions. These grains are heated to about one tenth of the cloud's depth in the core region. Their optical depths closely follow molecular column density structure, but these grains are considerably colder than the molecular gas. We detect 481 sources in the J,H, or K bands in a 0.184 deg. squared survey region in the cloud. Approximately 79 percent of the embedded 3 band (JHK) detected sources have near-infrared color indices greater than the local background population, suggesting that many of these objects are in pre-main-sequence evolutionary phases. The reddest of these sources are grouped in a high column and spatial density area within the survey region. Sources in this area have a normal power-law K luminosity function which is consistent with a theoretical model of a standard mass function and an age of 10(exp 5) yr. Sources exterior to this are have a luminosity function with an excess of intermediate luminosity sources that significantly differs from the luminosity function of the interior region. We interpret this non-standard luminosity function and the wide range of source reddenings in this peripheral region to be indicators of a considerable age (10(exp 6) yr) or age spread among sources there. We estimate that the cloud's star formation efficiency is currently greater than or equal to 25 percent. Dissert. Abstr.

N92-12791 California Univ., San Diego.
REFRACTIVE INTERSTELLAR SCINTILLATION EFFECTS IN PULSAR OBSERVATIONS Ph.D. Thesis
Yashwant Gupta 1990 234 p
Avail: Univ. Microfilms Order No. DA9121775

Propagation of radio waves through the interstellar medium (ISM) produces fluctuations in the observed intensity of a source because of the scattering caused by the irregular electron density distribution in the interstellar plasma. Under conditions of strong scintillations, the intensity fluctuations produced exhibit two predominant scales--the small scale (diffractive) fluctuations which are modulated by the large scale (refractive) fluctuations. Several aspects of the effect of refractive interstellar scintillation (RISS) in pulsar data are investigated. The results help to constrain the power spectrum of electron density fluctuations in the ISM. A first order modelling of the refractive phase fluctuations as a linear phase front in a thin screen geometry is used to describe the modulation of the decorrelation widths in time and frequency and the random change of drift of the intensity features with epoch. This model is tested using some actual pulsar dynamic spectra data at 408 MHz. It is found to provide a fairly good first order description. The refractive shift values inferred from the data agree quite well with predictions. The model, however, fails to explain the fluctuation of the temporal decorrelation width. More sophisticated models for the refractive phase fluctuations (which can explain these second order effects) are discussed. Some of these aspects of RISS are tested using numerical simulations of the scattering from a thin screen, for moderate (approx. = 20) values of strength of scattering (U). The refractive models are not found to work as well as for the real data. For inner scale values larger than the diffractive scale, the concepts of sub-images and caustics are found to provide a valid description of the periodic intensity modulation patterns. This allows investigation of the effect of varying inner scale on the nature of periodic patterns. The simulation results show enhanced frequency of occurrence of such patterns with increasing inner scale and/or decreasing U.
Dissert. Abstr.

N92-12792*# National Aeronautics and Space Administration, Washington, DC.
REPORTS OF PLANETARY ASTRONOMY, 1991
Oct. 1991 189 p
(NASA-TM-4329; NAS 1.15:4329) Avail: NTIS HC/MF A09 CSCL 03A

A collection is presented of summaries designed to provide information about scientific research projects conducted in the Planetary Astronomy Program in 1990 and 1991, and to facilitate communication and coordination among concerned scientists and interested persons in universities, government, and industry. Highlights of recent accomplishments in planetary astronomy are included. For individual titles, see N92-12793 through N92-12895.

N92-12793*# Maryland Univ., College Park. Astronomy Program.
OBSERVATIONS OF COMETS AND ASTEROIDS
Michael F. AHearn *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 1-2 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03A

All available ground based observational techniques were used to study the chemical and physical properties of the small bodies of the solar system, primarily comets and next asteroids. The ultimate goal is to use these bodies to understand the formation and evolution of the solar system. Progress and accomplishments, and publications are given. Author

N92-12794*# Maryland Univ., College Park. Astronomy Program.
THEORETICAL SPECTROSCOPY OF COMETS
Michael F. AHearn *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 3-4 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03A

Theoretical spectra were calculated of various emitting species in cometary comae both to study physical parameters that are measurable with cometary spectra and to provide fluorescence efficiencies for the derivation of abundances from fluxes. Author

N92-12795*# New Mexico State Univ., Las Cruces. Dept. of Astronomy.
LONG TERM CHANGES IN REFLECTIVITY AND LARGE SCALE MOTIONS IN THE ATMOSPHERE OF JUPITER AND SATURN
Reta Beebe *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 5-6 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03A

An observational study was made that used a CCD camera and multicolor filters with a committed f/40 60 cm telescope to image the temporal changes in Jupiter's and Saturn's atmospheres. The intent was to maintain a continuous data base to assist in relating the Voyager data with that of Galileo and Cassini.
Author

N92-12796*# Hawaii Univ., Honolulu. Planetary Geosciences Div.
INFRARED SPECTRAL STUDIES OF ASTEROIDS
Jeffrey F. Bell *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 7-8 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03A

The research objective was to improve the understanding of the surface mineralogy of asteroids and to link the vast existing body of meteorite geochemical data with specific astronomical objects which may be the targets of future NASA missions. The methodology used is as follow: (1) to use advanced astronomical instrumentation to obtain reflection spectra in the 0.3 to 5.2 micron wavelength range of selected asteroids; (2) to compare the asteroid data with similar data on simulated asteroid regoliths of various compositions to determine the surface mineralogy and meteoritic affinities of asteroid spectral classes and specific asteroids; (3) to integrate the mineralogical information with other astronomical data, orbital dynamics studies, and meteoritic geochemistry data to reconstruct the condensational, thermal, and collisional history of the present asteroids and their parent planetesimals; and (4) to use the information obtained to assist planning of future NASA asteroid missions such as Galileo and CRAF. Author

N92-12797*# National Optical Astronomy Lab. Tucson, AZ.
ANALYSIS AND INTERPRETATION OF CCD DATA ON P/HALLEY AND PHYSICAL PARAMETERS AND ACTIVITY STATUS OF COMETARY NUCLEI AT LARGE HELIOCENTRIC DISTANCE **c90**
Michael J. S. Belton and Beatrice Mueller *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 9-10 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03B

The scientific objectives were as follows: (1) to construct a well sampled photometric time series of comet Halley extending to large heliocentric distances both post and pre-perihelion passage and derive a precise ephemeris for the nuclear spin so that the physical and chemical characteristics of individual regions of activity on the nucleus can be determined; and (2) to extend the techniques in the study of Comet Halley to the study of other cometary nuclei and to obtain new observational data. Author

N92-12798*# National Optical Astronomy Lab. Tucson, AZ.
GALILEO-RELATED GROUND-BASED OBSERVATIONS OF THE JOVIAN SYSTEM **c91**
Michael J. S. Belton *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 11 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03B

The scientific objectives are to make millimeter observations of SO2 and other neutral molecules in Io's atmosphere and to conduct a program of observational and interpretive studies of the Jovian system in connection with the Galileo mission. Author

N92-12799*# Massachusetts Inst. of Tech., Cambridge. Dept. of Earth, Atmospheric, and Planetary Sciences.
PHOTOMETRY OF PLUTO-CHARON MUTUAL EVENTS AND HIRAYAMA FAMILY ASTEROIDS **c91**
Richard P. Binzel *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 13-14 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03B

During 1985 to 1990, nature provided earth bound astronomers with a once-per-century opportunity to observe occultation and transit phenomena between Pluto and its satellite, Charon. Ground based observations of these events are now being used to derive physical parameters for the Pluto-Charon system to a precision that is unlikely to be improved upon until in situ spacecraft observations are obtained. This program supports analysis of photometry observations from McDonald Observatory, a critical location in the International Pluto Campaign network. Knowledge of the diameters, masses, densities, and compositions derived from these observations will augment the understanding of Pluto's origin and its context within the problem of solar system formation.
Author

N92-12800*# Lowell Observatory, Flagstaff, AZ.
STUDIES OF ASTEROIDS, COMETS, AND JUPITER'S OUTER SATELLITES **c90**
Edward Bowell *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 15-17 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03B

Observational, theoretical, and computational research was performed, mainly on asteroids. Two principal areas of research, centering on astrometry and photometry, are interrelated in their aim to study the overall structure of the asteroid belt and the physical and orbital properties of individual asteroids. Two highlights are: detection of CN emission from Chiron; and realization that 1990 MB is the first known Trojan type asteroid of a planet other than Jupiter. A new method of asteroid orbital error analysis, based on Bayesian theory, was developed. Author

N92-12801*# Colorado Univ., Boulder. Lab. for Atmospheric and Space Physics.
EVOLUTION ON LARGE-SCALE PLASMA STRUCTURES IN COMETS: KINEMATICS AND PHYSICS **c90**
John C. Brandt *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 19-20 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03B

The disconnection event (DE) consists of the periodic loss of a comet's entire plasma tail and the growth of a new one. This spectacular phenomenon is not understood. The strategy was to assemble a data base of specific events studied in detail, determine the solar wind conditions responsible for DEs, and develop a consistent physical model. Analysis is complete for the sequence of DEs that took place during 13 to 18 April 1986. The first DE correlates well with a sector boundary crossing for the comet and a group of DEs that occurred approximately a day later could have produced by polarity reversals seen in the IMP-8 data. Thus, these DEs are consistent with the frontside, magnetic reconnection mechanism. Author

N92-12802*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
INFRARED OBSERVATIONS OF SMALL SOLAR SYSTEM BODIES
R. H. Brown *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 21-22 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03A

Infrared reflectance spectra were measured of dark primitive asteroids in the 2 to 5 micron wavelength region. The search was for organic complexes such and CN, CH, and NH in dark material on small bodies in the solar system. A search and study was made of volatiles such as nitrogen, methane, ammonia, and carbon monoxide, both as free ices and hydrates/clathrates, on icy surfaces in the outer solar system, using high resolution spectra obtained with a multichannel cooled grating, infrared spectrometer. An absorption that can be attributed to X-C (triple bond) N in the matrix of dark materials on the primitive asteroids. Author

N92-12803*# Cornell Univ., Ithaca, NY. National Astronomy and Ionosphere Center.
ARECIBO S-BAND RADAR PROGRAM **c32**
Donald B. Campbell *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 23-25 (For primary document

see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 17I

The high powered 12.6 cm wavelength radar on the 1000 ft Arecibo reflector is used for a variety of studies of solar system bodies. These include: (1) the radar mapping of the surfaces of Mercury, Venus, the moon and Mars in both senses (usually the two circulars) of received polarization; (2) high time resolution ranging measurements to Mercury and Mars to obtain height profiles and scattering parameters in the equatorial region and to test relativistic and gravitational theories; (3) measurements of the orbital parameters, scattering properties, figure and spin vectors of asteroids and comets; and (4) observations of the satellites of Mars, Phobos and Deimos, and the Galilean satellites of Jupiter.
Author

N92-12804*# Planetary Science Inst., Tucson, AZ.
PLANETARY ASTRONOMY
C. R. Chapman, D. R. Davis, S. B. Howell, and S. J. Weidenschilling *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 27-28 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03A

The goal is to use a variety of observational techniques and instruments, and to reduce, interpret, and synthesize ground based astronomical data concerning small bodies in the solar system, especially the asteroids, in order to study the compositions, physical characteristics, population properties, and evolution of these bodies. Progress was made in the following areas: faint asteroid taxonomy survey; photometric geodesy of Main Belt asteroids; and Main Belt and Near Earth Asteroids synthesis studies.
Author

N92-12805*# McDonald Observatory, Austin, TX.
PHYSICAL OBSERVATIONS OF COMETS: THEIR COMPOSITION, ORIGIN AND EVOLUTION **c90**
Anita L. Cochran, Edwin S. Barker, and William D. Cochran *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 29-31 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03B

The composition, origins, and evolution of comets were studied. The composition was studied using spectroscopic observations of primarily brighter comets at moderate and high resolution for the distribution of certain gases in the coma. The origins was addressed through an imaging search for the Kuiper belt of comets. The evolution was addressed by searching for a link between comets and asteroids using an imaging approach to search for an OH coma.
Author

N92-12806*# McDonald Observatory, Austin, TX.
RADIAL VELOCITY DETECTION OF EXTRA-SOLAR PLANETARY SYSTEMS **c91**
William D. Cochran *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 33-34 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03B

The goal of this program was to detect planetary systems in orbit around other stars through the ultra high precision measurement of the orbital motion of the star around the star-planet barycenter. The survey of 33 nearby solar-type stars is the essential first step in understanding the overall problem of planet formation. The program will accumulate the necessary statistics to determine the frequency of planet formation as a function of stellar mass, age, and composition.
Author

N92-12807*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, CA.
VOLATILES IN THE OUTER SOLAR SYSTEM **c90**
Dale P. Cruikshank *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 35-36 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03B

Telescopic data on asteroids, comets, planets, and planetary satellites are acquired and analyzed in the study of volatile ices and gases that occur on their surfaces and in their atmospheres. Infrared spectral studies of certain classes of asteroids for an analysis of their mineralogical and organic constituents are included.
Author

N92-12808*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, MD.
SPECTROSCOPIC PLANETARY DETECTION **c91**
Drake Deming *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 37-38 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03B

One of the most promising methods for the detection of extra-solar planets is the spectroscopic method, where a small Doppler shift (approx. 10 meter/sec) in the spectrum of the parent star reveals the presence of planetary companions. However, solar type stars may show spurious Doppler shifts due to surface activity. If these effects are periodic, as is the solar activity cycle, then they may masquerade as planetary companions. The goal of this study was to determine whether the solar cycle affects the Doppler stability of integrated sunlight. Observations of integrated sunlight were made in the near infrared (approx. 2 micron), using the Kitt Peak McMath Fourier transform spectrometer, with a N2O gas absorption cell for calibration. An accuracy of approx. 5 meter/sec was achieved.
Author

N92-12809*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, MD.
STUDIES OF THERMAL WAVE PHENOMENA ON THE JOVIAN PLANETS **c91**
Drake Deming *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 39-40 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03B

Ground based and Voyager observations of Jupiter have provided evidence that the tropospheric temperature shows global scale longitudinal variations which are often wavelike in character. Voyager data are reported to exhibit the presence of slowly moving thermal features, wherein the jovian tropospheric temperature patterns are not advected by the equatorial zonal winds, but are not found to rotate at the System III (interior) rate. Ground based data in a broad infrared band (8 to 13 micron) show a wavelike structure whose amplitude and spatial scale are similar to the reported properties of the slowly moving thermal features. This study is directed toward obtaining additional ground based data in infrared spectral bands whose contribution functions are optimized for specific atmospheric regions (tropospheric at 20 micron, and stratospheric at 7.8 micron), in order to confirm the previous results, and to identify the nature and physical significance of wavelike longitudinal temperature fluctuations on the Jovian planets. A 2-D infrared array detector and low resolution cryogenic grating spectrometer is being adapted to obtain maps in approx. 2/cm bandpasses.
Author

N92-12810*# Massachusetts Inst. of Tech., Cambridge. Dept. of Earth, Atmospheric, and Planetary Sciences.
OCCULTATION STUDIES OF THE SOLAR SYSTEM
James L. Elliot *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 41-42 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03A

Because of their high spatial resolution, stellar occultations have proven extremely effective for learning about planetary upper atmospheres, asteroids, and planetary rings. The occultation program at MIT involves the following: (1) identifying the scientific questions that can be answered by occultation events; (2) predicting the zone of visibility for the useful events; (3) maintaining and improving a high speed CCD camera for observing occultations; (4) obtaining the observations; and (5) reducing the data and interpreting the results.
Author

N92-12811*# Arizona Univ., Tucson. Lunar and Planetary Lab.
PLANETARY SPECTROSCOPY **c91**

Uwe Fink *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 43-44 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03B

The effort is divided into instrumentation and observational research. In the area of instrumentation, the primary objective is the maintenance and slow improvement of the CCD camera and data acquisition system for continuing use of any interested LPL user. The main goal of the observational research is CCD spectroscopic and imaging studies of the solar system in support of spacecraft investigations. The studies include the physical behavior of comets, the atmospheres of the gaseous planets, and the solid surfaces of satellites and asteroids. Author

N92-12812*# Allegheny Observatory, Pittsburgh, PA.
ALLEGHENY OBSERVATORY SEARCH FOR PLANETARY SYSTEMS
George D. Gatewood *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 45-46 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03A

The newly developed Multichannel Astrometric Photometer (MAP) and a rebuilt red light 0.76 meter Thaw refractor are used in an astrometric observational program to detect Jupiter-like planets in orbit about nearby stars. The program includes 15 stars and is obtaining approx. 12 good observations per year of each of them, sufficient to assure an annual normal point precision of 0.001 arcsec (1 mas) per object. The observational program will yield the first astrometric information about planetary systems in general. The astrometric technique is most sensitive to nearby planetary systems and to massive planets that have orbits that place them within the regions around a star where the temperature is sufficiently low to permit the existence of water ice grains. Thus it covers a different search space than that of radial velocity techniques. Currently the only astrometric survey program, it is complementary to other detection programs and some target stars have been included to assure overlap with them. The minimum detectable mass varies with the particular target star from objects almost twice as massive as Neptune to bodies almost twice as massive as Jupiter. Author

N92-12813*# Arizona Univ., Tucson. Lunar and Planetary Lab.
SURVEYING OF THE SOLAR SYSTEM
Tom Gehrels *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 47 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03A

Some populations of objects in the solar system are poorly known, and the long range goal of this program is to improve that situation. For instance, the statistics of Trojan asteroids is being studied. A new technique is being developed for sky surveillance by scanning with CCD, particularly for the discovery of near Earth asteroids. Author

N92-12814*# Hawaii Univ., Honolulu. Inst. for Astronomy.
OPERATION OF THE UNIVERSITY OF HAWAII 2.2M TELESCOPE ON MAUNA KEA
Donald N. B. Hall *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 49-50 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03A

NASA's planetary astronomy program provides part of the funding for the 2.2 meter telescope. The parameters for time on the telescope are laid out. A major instrumental highlight has been the commissioning of a 256 x 256 near infrared camera which uses a Rockwell NICMOS-3 array. At the f/10 focus, image scales of 0.37 and 0.75 arcsec/pixel are available. A new, high quantum efficiency Tektronix 1024 x 1024 CCD saw first light on the telescope in 1991, and was available regularly from April 1991. Data from both of these detectors are transmitted directly to the Sun workstation for immediate analysis by the observers. The autoguider software was enhanced to permit guided tracking on objects have nonsideral motions (i.e., solar system objects). Author

N92-12815*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
INFRARED OBSERVATIONS OF COMETS
Martha S. Hanner *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 51-52 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03A

Selected comets are observed in the near infrared (1 to 2.2 micron) and thermal infrared (3.5 to 20 micron) with the NASA Infrared Telescope Facility (IRTF) and other telescopes as appropriate, in order to characterize the physical properties of the dust grains; their composition, size distribution, emissivity, and albedo. Systematic variations in these properties among comets are looked for, in order to understand the heterogeneity of comet nuclei. Spectrophotometry of the 10 micron silicate emission feature is particularly emphasized. The rate of dust production from the nucleus and its temporal variability are also determined. Knowledge of the dust environment is essential to S/C design and mission planning for NASA's CRAF mission. Author

N92-12816*# Naval Observatory, Washington, DC.
SEARCH FOR PLANET X Abstract Only
Robert S. Harrington *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 53 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03A

The observation of the region of the sky in which it is believed Planet X should now be, based on perturbations observed in the motions of Uranus and Neptune, was determined, and there was no reason to update that determination. A limited area of that region was photographed, and that will be continued. A given area is photographed with the twin 20 cm astrograph in New Zealand on two successive nights near the time that area is in opposition, and these plates are blinked in Washington to identify anything that has moved. The predicted region is in the south, which requires observations from a southern station, and it is in opposition in the April to June period, which means observations have not yet started for the year. Blinking will be done as soon as the plates are received in Washington. Author

N92-12817*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
ASTEROID PHOTOMETRY
Alan W. Harris *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 55-56 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03A

Photoelectric light curves provide fundamental information about asteroids: rotation periods, pole orientations, shapes, and phase relations, which yield some information about the surface physical properties. This task is to carry on a program of such observations to increase the overall data base, obtain data on newly discovered asteroids, and to observe asteroids which are the subject of other complementary observations, such as occultations, radar, and infrared. Author

N92-12818*# Planetary Science Inst., Tucson, AZ.
STUDIES OF RELATIONSHIPS AMONG OUTER SOLAR SYSTEM SMALL BODIES AND RELATED OBJECTS **c90**
William K. Hartmann *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 57-58 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03B

This program involves telescopic observations of colorimetry, spectroscopy, and photometry of small bodies of the solar system, emphasizing possible relationships among outer solar system asteroids, comets, and certain satellites. Earth approacher targets of opportunity and lab spectroscopic studies are included. Author

N92-12819*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
PALOMAR PLANET-CROSSING ASTEROID SURVEY (PCAS) **c90**
Eleanor F. Helin *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 59-60 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03B

The objective is the discovery and follow-up of planet-crossing asteroids, related inner-belt asteroids, and comets. The primary program is carried out with the 0.46 m Schmidt telescope at Palomar Observatory. The results, subsequent observations, and analysis provide insight into their populations, orbits, origins, physical characteristics (composition, size, and shape), potential for impact, relationships to comets and meteorites, and for future spacecraft mission candidates. Author

N92-12820*# Wyoming Univ., Laramie.
INFRARED SPECKLE INTERFEROMETRY AND SPECTROSCOPY OF IO
Robert R. Howell *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 61-62 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03A

The goal during the last year was to continue the speckle monitoring of volcanic hot spots on Io, and to begin observations of the 1991 series of mutual events between Io and Europa. The former provide a time history of the volcanic activity, while the latter give the highest spatial resolution and the best sensitivity to faint spots. A minor component of the program is lunar occultation observations of young T Tauri stars. The occultations provide milliarcsecond resolution which let us search for circumstellar material and determine which systems are multiple. Author

N92-12821*# Arizona Univ., Tucson. Lunar and Planetary Lab.
INTERIORS AND ATMOSPHERES OF THE OUTER PLANETS **c91**
W. B. Hubbard *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 63-64 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03B

This theoretical/observational project constrains structure of outer planet atmospheres and interiors through observational data. The primary observation tool is through observations of occultations of stars by outer solar system objects, which yield information about atmospheric temperatures and dynamics, and planetary dimensions and oblateness. The theoretical work relates the data to interior structures in a variety of ways. Author

N92-12822*# Arizona Univ., Tucson. Lunar and Planetary Lab.
STUDIES OF EXTENDED PLANETARY ATMOSPHERES **c91**
D. M. Hunten *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 65-66 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03B

The following topics are covered: (1) telescopic observations and analysis of planetary atmospheres (including the Moon and Mars) and the Io torus; (2) occultation observations; and (3) supporting laboratory studies. Author

N92-12823*# California Univ., Davis. Dept. of Chemistry.
LASER STUDIES OF THE PHOTODISSOCIATION DYNAMICS OF COMETARY RADICALS **c90**
William M. Jackson *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 67-68 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03B

In the past year, it was shown that in the 193 nm photolysis of C2H, the C2 radical is produced in a variety of electronic, vibrational, and rotational states. The relative population of the vibrational and rotational states of C2(A 1 Pi u), C2(B 1 Sigma g +), and C2(A 3 Pi u) were determined in a static gas cell and in a pulsed molecular beam. It seems as though the original angular momentum of the C2H molecule appears as part of the angular momentum of the C2 radical. A attempt is being made to discover the mathematical relationship that governs this mapping. New information about the bond dissociation energy of the C2 radical was produces. C2(b 3 Sigma g -) and C2(1 Delta g) were detected in the photolysis of C2H via time resolved infrared emission spectroscopy. In the former case, vibrational excitation up to v'' = 4 is observed. All of the results suggest that the C2 models in comets need to consider the presence of vibrationally excited C2 radicals in comets. The laser induced fluorescence spectra of the C3 was observed as a product of the 193 nm photolysis of allene and propyne. The populations of the rotational levels are identical in both cases. This result has led us to conclude that an isomerization reaction occurs in the photolysis of propyne which leads to the same C3H2 intermediate that is formed in the photolysis of C3H4. Since the former molecule is one of the most abundant in the interstellar medium it is also likely that its precursor is also present in comets. This would explain why C3 is observed in comets. Author

N92-12824*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
GOLDSTONE SOLAR SYSTEM RADAR **c14**
Raymond F. Jurgens *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 69 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 14B

This task provides for the planning, experiment design, and coordination of the data acquisition and engineering activities in support of all Goldstone planetary radar astronomy. Activities related to up-grades of the receiver systems, transmitter systems, and data processing support systems are currently intense. Also, the hardware and software maintenance of the data processing facility used by many of the Goldstone Solar System Radar investigators are covered. Author

N92-12825*# State Univ. of New York, Stony Brook. Astronomy Program.
INFRARED VARIABILITY OF JUPITER AND SATURN
Roger Knacke and K. S. Noll *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 71-72 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03A

Infrared spectroscopy provides unique insights into the chemistry and dynamics of the atmospheres of Jupiter and Saturn, and of the enigmatic satellite of Saturn, Titan. The 5 micron spectral region of these objects is transparent to deep levels, and is therefore particularly useful for the identification of molecules that are present at very low (parts per billion) concentrations. In Titan, 5 micron observations probe atmospheric layers at or near the surface. Ground-based spectroscopy complements Voyager, Galileo, and Cassini measurements. The spectroscopy is sensitive to lower mixing ratios for selected molecules, while the on-board mass and infrared spectrometers probe molecules and levels that are inaccessible form the ground. The observations also provide time-based data for preparation of the upcoming missions. Author

N92-12826*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, MD.
ADVANCED INFRARED ASTRONOMY
Theodor Kostiuk *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 73-74 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03A

This task supports the application of infrared heterodyne spectroscopy and other high resolution techniques, as well as infrared arrays to ultra-high resolution studies of molecular constituents of planetary atmospheres. High spectral and spatial resolution measurement and analysis of individual spectral lines permits the retrieval of distributions of atmospheric molecular abundances and temperatures and thus, information on local photochemical processes. Determination of absolute line positions

to better than 10(exp -8) permits direct measurement of gas velocities to a few m/sec and thus, the study of dynamics. Observations are made from ground based observatories.
Author

N92-12827*# Arizona Univ., Tucson. Lunar and Planetary Lab.
COMETARY SPECTROSCOPY AND IMAGING
Stephen M. Larson *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 75-76 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03A

The objective is to investigate the spectroscopic and morphological characteristics of comets and selected minor planets over a wide range of heliocentric distances as they may suggest or constrain models of cometary processes, their formation environments and evolution. Direct images of all observable comets and 300-800 nm spectra of the brighter ones are obtained on a monthly basis with a charge coupled device spectrograph-camera. The direct images may be used for astrometry, photometry, and studies of coma and tail morphology. In some cases, anisotropic dust emission can provide information on the nucleus spin vector. Spectra may provide data on strengths of the principle emission for comparison of gas/dust ratios of a large sample of comets. Long integrations of minor planets in comet-like and nearby orbits are made to search for faint comae.
Author

N92-12828*# Arizona Univ., Tucson. Lunar and Planetary Lab.
INFRARED OBSERVATIONS OF SOLAR SYSTEM OBJECTS
Larry A. Lebofsky *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 77-78 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03A

This is an ongoing groundbased infrared study of solar system objects. This is a broadbased program with the overall objective of studying the spectral and physical properties of small solar system bodies. The work spans the entire solar system from a study of the mineralogy of Mercury, to several studies of asteroids, and to studies of Triton, Pluto, and Charon. From these studies, it is hoped that a better understanding of the origin and evolution of these bodies and how they fit into the context of the origin and evolution of the solar system as a whole will be gained.
Author

N92-12829*# Lowell Observatory, Flagstaff, AZ.
OUTER PLANET STUDIES **c91**
Barry L. Lutz *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 79-80 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03B

The focus is on observational studies of the composition, structure, and variability of planetary, satellite, and cometary atmospheres. The techniques used include spectroscopy, spectrophotometry, and photometric imaging in the spectral region from 3000 A to 5 microns. In addition to carrying out basic research into the origin, evolution, and current state of the solar system, these studies provide ground-truth support for observations of the solar system by NASA's missions, including the Voyager and Galileo Spacecraft, the Hubble Space Telescope, and the proposed Comet Rendezvous Asteroid Flyby (CRAF)-Cassini Mission.
Author

N92-12830*# Smithsonian Astrophysical Observatory, Cambridge, MA.
ASTROMETRIC OBSERVATIONS OF COMETS AND ASTEROIDS AND SUBSEQUENT ORBITAL INVESTIGATIONS
B. G. Marsden *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 81-82 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03A

The transformation of the Oak Ridge astrometry from a photographic program to a charge coupled device (CCD) program can now be considered complete, and the number of observations being made is now approaching an order of magnitude greater than in the old photographic program. Astrometric observations with the 1.5-m reflector were made at the Oak Ridge Observatory, and the progress, accomplishments, and projected accomplishments are presented.
Author

N92-12831*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
RESEARCH IN PLANETARY ASTRONOMY
K. Matthews and B. T. Soifer *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 83 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03A

The focus was on the study, via near infrared observations, of the outer planets and their satellites. In the last year, these observations have emphasized imaging observations using the Cassegrain infrared camera at the f/70 focus of the 200 inch Hale telescope.
Author

N92-12832*# Arizona Univ., Tucson. Lunar and Planetary Lab.
THE RADIAL VELOCITY SEARCH FOR EXTRASOLAR PLANETS
Robert S. McMillan *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 85-86 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03A

Radial velocity measurements are being made to search for planets orbiting stars other than the Sun. The reflex acceleration induced on stars by planets can be sensed by measuring the small, slow changes in the line-of-site velocities of stars. To detect these planetary perturbations, the data series must be made on a uniform instrumental scale for as long as it takes a planet to orbit its star. A spectrometer of extreme stability and unprecedented sensitivity to changes in stellar radial velocities was operated.
Author

N92-12833*# Hawaii Univ., Honolulu. Inst. for Astronomy.
OBSERVATIONAL EVIDENCE OF AGING PROCESSES IN COMETS **c90**
Karen J. Meech *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 87-88 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03B

Emphasis was on searching for systematic differences among two groups of comets: periodic comets which spend most of their time in the vicinity of the inner Solar System and the new comets which are believed to be passing through the inner Solar System for the first time. Such differences are expected, but have never been observed, in part because there has never been a systematic observational program aimed at addressing this question. Understanding possible physical and compositional differences between these two groups will lead to a better understanding of the cometary formation conditions in the early Solar System. The employed method studies the activity in the comets as a function of distance by obtaining charge coupled device (CCD) observations of the comets at frequent intervals on both the pre- and post-perihelion legs of their orbits in order to ascertain the distances at the onset and turn-off of activity through comparison with sublimation models.
Author

N92-12834*# Lowell Observatory, Flagstaff, AZ.
OCCULTATION STUDIES OF THE SOLAR SYSTEM
Robert L. Millis *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 89-90 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03A

Occultations of stars by planets, satellites, planetary ring systems, and asteroids offer opportunities to study the occulting bodies in ways not otherwise possible from the surface of the Earth. For example, one can detect even an extremely tenuous atmosphere and can measure the temperature and density profiles of the atmosphere in regions not ordinarily sampled by spacecraft. Occultations also permit direct measurement of the size and shape of solar system objects too small to be directly resolved by groundbased telescopes. The accuracy of such determinations is

typically 1-2 percent and, moreover, is independent of the distance to the object. In this investigation, upcoming occultations through wide-ranging computer searches are identified, and accurate predictions for the more important events are provided. Selected occultations are observed with specially designed portable photometric equipment. Author

N92-12835*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
PHYSICAL PROCESSES IN COMETS c90
Ray L. Newburn, Jr. *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 91-92 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03B

Post-Halley comets are known to be irregular objects with most nucleus activity very localized and with the dust coma capable of fragmentation and apparently being a source of gas. Older, 1-D strategies which assume steady isotropic outflow of material can give poor time-and-space averaged results, at best. With 2-D data, images through interference filters, it is hoped that: dust structures can be seen that give evidence of the proper geometry for data reduction; gradients along the axes of symmetry and evidence of fragmentation can be studied; and that evidence for gas abundance gradients associated with the dust can be found. High quality data from brighter comets can then be used to suggest improved data reduction procedures for fainter ones. To obtain such data, large image-quality interference filters were procured for use with a charge coupled device (CCD) camera at Lick Observatory, where the scale of the 1 m Nickel reflector is ideal for brighter comets. Whenever possible, data is taken simultaneously with other telescopes and equipment, especially spectroscopy at the Lick 3 m or infrared photometry at the Infrared Telescope Facility (IRTF) on Mauna Kea. Author

N92-12836*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, MD.
IMAGING STUDIES OF COMETS c90
Malcolm B. Niedner, Jr., Daniel A. Klinglesmith, III, and David J. Westpfahl (New Mexico Inst. of Mining and Technology, Socorro.) *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 93-94 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03B

The Joint Observatory for Cometary Research's (JOCR) historical mission has been to provide understanding of large-scale interactions between bright comets and solar wind using wide-angle (Schmidt) imagery and spacecraft data; in this pursuit the JOCR has excelled. The 16 inch Newtonian/Cassegrain telescope was upgraded to permit filtered, narrow-field charge coupled device (CCD) imaging of both bright and faint comets. Thus, the goal of obtaining narrow-band imagery of the near-nuclear region of bright comets was added to JOCR's original mission with emphasis on ionization processes and total gas production. A 300 mm lens/CCD system exists with 3 degree field of view (FOV) which uses comet filters; this system bridges the gap between the wide-field (8 x 10 deg) Schmidt plates and the several-arcmin. field of the 16 inch telescope. JOCR is located under dark skies on South Baldy Mountain (el. 10,600 ft.) near Socorro, NM, and is one of the last truly dark sites in the continental U.S. Author

N92-12837*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
RADAR INVESTIGATION OF ASTEROIDS AND PLANETARY SATELLITES
Steven J. Ostro *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 95-96 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03A

Radar reconnaissance of near-Earth asteroids, mainbelt asteroids, the Galilean satellites, the Martian satellites, and large Saturnian satellites, using the Arecibo 13-cm and the Goldstone 3.5-cm systems is discussed. Measurements of echo strength, polarization, delay/Doppler distribution of echo power provide information about dimensions, spin vector, large-scale topography, cm-to-m-scale morphology, and surface bulk density. The observations also yield refined estimates of target orbital elements. Author

N92-12838*# Arizona Univ., Tucson. Lunar and Planetary Lab.
STELLAR OCCULTATIONS BY PLANETARY RINGS: 3 JULY 1989 28 SGR OCCULTATION BY SATURN
Carolyn C. Porco and B. Hubbard *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 97-98 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03A

The near infrared observations of the 3 Jul. 1989 occultation of 28 Sagittarii by Saturn and its rings made from seven different telescopes spread around the world were reduced and synthesized. These observations were combined with Voyager data to study the dynamical state of Saturn's rings. This unique event, which occurred eight years after the Voyager flybys, provides a temporal baseline over which kinematical and dynamical phenomena within the rings may be examined in detail. Author

N92-12839*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.
OBSERVATIONAL STUDIES OF THE EXOSPHERES OF THE MOON AND MERCURY
Andrew Potter and Thomas Morgan *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 99-100 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03A

The sodium and potassium atmospheres of Mercury and the Moon are mapped using spectroscopic measurements of resonance scattered sunlight. The objective is to define the sources and sinks for these atmospheric constituents, and in doing so, provide a better understanding of atmospheric processes on these bodies. These bodies are unique in that their atmospheres consist solely of an exosphere with the planetary surface at its base. Author

N92-12840*# Wisconsin Univ., Madison. Dept. of Physics.
GROUND-BASED OBSERVATIONS OF COMETS, THE JUPITER PLASMA TORUS, AND IO
Frank Scherb and Fred L. Roesler *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 101-104 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03A

Aspects of cometary and magnetospheric physics were investigated by means of ground-based astronomical spectroscopy. High-throughput, dual-etalon Fabry-Perot spectrometers were used to obtain very high resolution spectra of atomic, molecular, and ionic emission lines from the diffuse gases and plasmas associated with comets and the Jupiter plasma torus. The Fabry-Perot spectrometers were also used with a charge coupled device (CCD) camera to obtain images of these extended emission sources in individual spectral lines at high spectral resolution. A new program using the McMath solar-stellar spectrograph to observe emission lines from Io was recently initiated. The McMath spectrograph has a high resolution mode which allows the detection of narrow, relatively faint emission lines superimposed on Io's reflected solar spectrum. Author

N92-12841*# Lowell Observatory, Flagstaff, AZ.
GROUNDBASED COMETARY STUDIES
David G. Schleicher *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 105-106 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03A

The physical properties of comets were studied by applying a wide variety of observational techniques. Emphasis is on simultaneous or coordinated observations in different spectral regions (e.g., visible and thermal IR or visible and far UV) or with different instrumentation (imaging, spectroscopy, and photometry). The aim was to: (1) measure the basic properties of cometary nuclei by studying comets whose comae are so anemic that the

signal from the nucleus can be extracted; (2) investigate the group characteristics of comets by narrowband photometry applied uniformly to a large sample of comets; (3) understand the detailed physics and chemistry occurring in cometary comae through wide-field charge coupled device (CCD) imaging using narrow filters and through long-slit CCD spectroscopy; and (4) investigate the rotational states of comets through time-resolution photometry. Author

N92-12842*# Massachusetts Univ., Amherst. Dept. of Physics and Astronomy.
RADIATIVE TRANSFER IN PLANETARY ATMOSPHERES
F. Peter Schloerb *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 107-108 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03A

A wide range of topics are covered including the following: (1) the observational study of cometary comae via millimeter and radio spectroscopy; (2) observational and theoretical studies of planetary atmospheres at millimeter wavelengths; and (3) application of theoretical models of the reflection of light from solid surfaces to the study of planetary regoliths and planetary rings. Author

N92-12843*# Smithsonian Astrophysical Observatory, Cambridge, MA.
RADAR STUDIES IN THE SOLAR SYSTEM
Irwin I. Shapiro *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 109-110 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03A

A study of the solar system by means of ground based radar is presented. Emphasis was on developing the ephemerides needed to acquire radar data at Arecibo Observatory. Concentration was also on analyzing the resultant data to: test fundamental laws of gravitation; determine the size, shape, topography, and spin vectors of the targets; and study the surface properties of these objects, through their scattering law and polarization characteristics. Author

N92-12844*# Texas Univ., Austin.
PLANETARY ASTRONOMY
Harlan J. Smith *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 111-112 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03A

Lunar-based astronomy offers major prospects for solar system research in the coming century. In addition to active advocacy of both ground-based and Lunar-based astronomy, a workshop on the value of asteroids as a resource for man is being organized. The following subject areas are also covered: (1) astrophysics from the Moon (composition and structure of planetary atmospheres); (2) a decade of cost-reduction in Very Large Telescopes (the SST as prototype of special-purpose telescopes); and (3) a plan for development of lunar astronomy. Author

N92-12845*# Illinois Univ., Urbana. Dept. of Astronomy.
RADAR INTERFEROMETRIC STUDIES OF COMETS
Lewis E. Snyder, Patrick Palmer, and Imke DePater (California Univ., Berkeley.) *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 113-114 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03A

Our objectives are to use radio interferometry to study composition, velocity distribution, maser excitation, and plasma interactions of cometary gas. Two new cometary chemistry programs were started with radio interferometers: (1) the VLA used to search for HC3N emission from Comet Brorsen-Metcalf at 3.3 cm wavelength; and (2) the BIMA millimeter array used to observe Comet Austin in HCN. Author

N92-12846*# California Univ., Berkeley. Dept. of Astronomy.
SPATIALLY RESOLVED QUANTITATIVE SPECTROSCOPY OF COMETS
Hyron Spinrad *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 115-116 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03A

The chemical composition of cometary nuclei and the velocity field of the ejected daughter species were investigated through conventional, high-resolution spectroscopy and indirectly by imaging the dissociation radicals in the outflowing cometary comae. Gas production rates and comae symmetries were studied, and coma outflow mechanisms were modeled. Author

N92-12847*# Massachusetts Univ., Amherst. Five Colleges Dept. of Astronomy.
THE EVOLUTION OF YOUNG STELLAR OBJECT DISKS AND THEIR ENVIRONMENT **c90**
Stephen E. Strom, Suzan Edwards, and Karen M. Strom *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 117-120 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03B

The main efforts were directed towards determining the frequency of disk occurrence and the timescales for disk evolution for solar-type and intermediate mass stars. The results of the investigation showed that optically thick disks are accretion disks. The projected accomplishments are also discussed. Author

N92-12848*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
VISUAL AND INFRARED STUDIES OF ASTEROIDS AND THE PLUTO-CHARON SYSTEM
Edward F. Tedesco *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 121 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03A

The strategy of the project was to: (1) analyze light curves of Pluto-Charon mutual eclipse event light curves to derive models of the Pluto-Charon system; (2) use these results in planning and reducing HST observations tentatively scheduled to be obtained in Aug. 1991 to determine Pluto-Charon mass ratio; and (3) obtain visual and IR photometry of selected asteroids to help determine their albedos, sizes, shapes, pole orientations, taxonomic classes, and phase functions. Author

N92-12849*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
PLANETARY OPTICAL AND INFRARED IMAGING
Richard J. Terrile *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 123-124 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03A

The purpose is to obtain and analyze high spatial resolution CCD coronagraphic images of extra-solar planetary material and solar system objects. These data will provide information on the distribution of planetary and proto-planetary material around nearby stars leading to a better understanding of the origin and evolution of the solar system. Author

N92-12850*# Hawaii Univ., Honolulu. Inst. for Astronomy.
STUDIES OF TRITON AND THE PLUTO-CHARON SYSTEM **c91**
David J. Tholen *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 125-126 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03B

The project is designed to take advantage of the six-year-long series of mutual occultation and eclipse events involving Pluto and its satellite Charon during one of its rare edge-on orbital alignments. High-precision, high-time-resolution photometry of these events can be utilized to extract several important physical parameters. An important derived parameter is the mean density of the system, which constrains the bulk composition of two bodies. Author

N92-12851*# Hawaii Univ., Honolulu. Inst. for Astronomy.
VISIBLE AND INFRARED INVESTIGATIONS OF PLANET-CROSSING ASTEROIDS AND OUTER SOLAR SYSTEM OBJECTS
David J. Tholen *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 127-128 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03A

The project is supporting lightcurve photometry, colorimetry, thermal radiometry, and astrometry of selected asteroids. Targets include the planet-crossing population, particularly Earth approachers, which are believed to be the immediate source of terrestrial meteorites, future spacecraft targets, and those objects in the outer belt, primarily the Hilda and Trojan populations, that are dynamically isolated from the main asteroid belt. Goals include the determination of population statistics for the planet-crossing objects, the characterization of spacecraft targets to assist in encounter planning and subsequent interpretation of the data, a comparison of the collisional evolution of dynamically isolated Hilda and Trojan populations with the main belt, and the determination of the mechanism driving the activity of the distant object 2060 Chiron. Author

N92-12852*# Texas Univ., Austin.
A CONTINUED PROGRAM OF PLANETARY STUDY AT THE UNIVERSITY OF TEXAS MCDONALD OBSERVATORY c91
L. Trafton *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 129-130 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03B

The program conducts solar system research in support of NASA missions and of general astronomical interest. Investigations of composition, physical characteristics and changes in solar system bodies are conducted primarily using the facilities of McDonald Observatory. Progress, accomplishments, and projected accomplishments are discussed. Author

N92-12853*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.
COMPOSITIONAL STUDIES OF PRIMITIVE ASTEROIDS c90
Faith Vilas *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 131-132 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03B

The aqueous alteration history in the solar system are studied through acquiring additional CCD reflectance spectra in the blue-UV through near-IR spectral region and analyzing these spectra for information about iron oxides in phyllosilicates identified in the CM and CI carbonaceous chondrites. Emphasis is on the main-belt and Cybele primitive asteroids, as these asteroids show spectral diversity and are also spectral analogues for known meteorite samples. The porphyrin bands found in organics near 0.4 micron is also sought. Author

N92-12854*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
ASTROMETRIC OBSERVATIONS OF COMETS AND MINOR PLANETS
J. G. Williams and J. Gibson *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 133 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03A

Comets and planet crossing asteroids are observed so that accurate positions can be determined. The observations are made with the Palomar 1.5 m telescope equipped with a CCD array. The combination of telescope and detector is quite effective at recording faint comets and minor planets. This proves useful for early acquisition of comets and asteroids returning for a new opposition. The resulting positions permit accurate orbits to be determined and allow the properties of the comets and asteroids to be measured by other observers using a variety of techniques. Recoveries and other notable observations of comets and planet crossing asteroids observed during the past years are discussed. Author

N92-12855*# Arizona Univ., Tucson. Lunar and Planetary Lab.
PHYSICAL STUDIES OF SMALL ASTEROIDS AND COMETARY NUCLEI c90
Wieslaw Z. Wisniewski *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 135-136 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03B

Photoelectric and CCD photometry of small asteroids in the 0.5-25 km diameter range and cometary cores are discussed. It is to reconcile the observed physical properties of those bodies with models and laboratory experiments. As there is an inevitable spread between the laboratory scale and the real asteroid scale, the observations of smaller bodies offer us a natural laboratory to serve as an intermediate link between experimental sizes and real ones. Whenever possible, UBVWX color are obtained to define taxonomic classes. Author

N92-12856*# Arizona State Univ., Tempe.
SPECTROSCOPY OF COMETS
Susan Wyckoff *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 137-138 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03A

Observations of NH2, OI, CH, CO(+), CO2(+), H2O(+), and N2(+) in optical spectra of comets represent ionization and dissociation product abundances of N2, NH3, H2O, CH4, CO2, and CO. The primary objectives are to determine: (1) accurate production rates for the observed species, and (2) accurate relative abundances of condensates in a sample of comet nuclei. The ultimate goal is to constrain models of comet formation and chemical processing in the outer primordial solar nebula. Author

N92-12857*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
COMET AND ASTEROID DYNAMICS c90
Donald K. Yeomans *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 139-140 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03B

In order to provide the ground-based observing community and NASA flight projects with accurate comet and asteroids ephemerides, improvements are being made to the existing dynamic models and new data type are being investigated. For active comets, non-gravitational forces must be taken into account; these forces are assumed due to the rocket-like thrusting of outgassing cometary ices. Author

N92-12858*# National Optical Astronomy Lab. Tucson, AZ.
HALLEY'S SPIN STATE DETERMINED c90
Michael J. S. Belton *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 143 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03B

Since VEGA and GIOTTO flybys of comet Halley, there was a rising controversy about the nature of the spin state of its nucleus. The problem was resolved by M. J. S. Belton et al., who found a spin state that simultaneously satisfies the VEGA and GIOTTO imaging data and a wide range of ground-based data. The total spin is not fixed in the nucleus but is inclined to the total angular momentum vector at an average angle of 21.4 deg and precesses around it with an average period of 3.69 days. Author

N92-12859*# National Optical Astronomy Lab. Tucson, AZ.
IO'S ATMOSPHERE DETECTED BY GROUND-BASED MICROWAVE SPECTROSCOPY c91
Michael J. S. Belton *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 144 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03B

Io's corona and extended atmosphere, i.e., the plasma torus

and neutral Na and K clouds, were the subject of intensive ground-based studies. E. Lellouch et al. not only detected but also fully resolved the profiles of two pure rotational lines of SO2. The lines were found in emission showing that early theoretical predictions for a thermally inverted atmospheric structure were correct. Author

N92-12860*# Lowell Observatory, Flagstaff, AZ.
DETECTION OF CN EMISSION FROM (2060) CHIRON **c91**
Edward Bowell *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 145-146 (For primary document see N92-12792 03-89)
(Grants NAGw-1470; NAGw-1864; NAGw-1886)
Avail: NTIS HC/MF A09 CSCL 03B

Spectrophotometric observations of (2060) Chiron were obtained. Their primary goal was to look for the subtle differences in color between Chiron and its surrounding coma, and to search for possible absorption or emission features in Chiron's spectrum. The presence of the CN(0-0) emission band was identified. It proves Chiron's cometary nature and breaks the record heliocentric distance for cometary gaseous emission. Author

N92-12861*# Lowell Observatory, Flagstaff, AZ.
THE 1990 MB: THE FIRST MARS TROJAN **c91**
Edward Bowell *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 147 (For primary document see N92-12792 03-89)
(Grant NAGw-1470)
Avail: NTIS HC/MF A09 CSCL 03B

Asteroid 1990 MB was discovered during the course of the Mars and Earth-crossing Asteroid and Comet Survey. An orbit based on a 9-day arc and the asteroid's location near Mars L5 longitude led to speculation that it might be in 1:1 resonance with Mars, analogous to the Trojan asteroids of Jupiter. Subsequent observations strengthened the possibility, and later calculations confirmed it. The most recent orbit shows that the asteroid's semimajor axis is very similar to that of Mars. Author

N92-12862*# Colorado Univ., Boulder.
THE LAST DISCONNECTION EVENTS IN COMET HALLEY IN APRIL 1986 Abstract Only **c90**
John C. Brandt *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 148 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03B

Disconnection event (DE) in cometary plasma physics is the regular loss of the entire plasma tail and the growth of the new one. Analysis of a sequence of DEs that occurred 13-18 April, 1986 shows that they correlate well with a magnetic, sector-boundary crossing and a complex magnetic structure in the solar wind with polarity reversals that occurred about one day later. These events are entirely consistent with sunward, magnetic reconnection as the DE mechanism. Author

N92-12863*# Planetary Science Inst., Tucson, AZ.
PLANETARY ASTRONOMY Abstract Only
C. R. Chapman *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 149 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03A

Many asteroids are known to be non-spherical, as revealed by changes in their brightness as they rotate (light curves) and present varying cross-sections to view. Models of collisional evolution of the asteroid belt suggest that many of the larger asteroids are shattered rubble piles, consisting of fragments bound together by gravity. If these assemblages are sufficiently weak, they should relax to equilibrium shapes that depend only on their spin periods and densities. Thus, if shape of an asteroid is known, one might infer its density and internal structure. Author

N92-12864*# McDonald Observatory, Austin, TX.
PHYSICAL OBSERVATIONS OF COMETS: THEIR COMPOSITION, ORIGIN AND EVOLUTION **c90**
Anita L. Cochran, Edwin S. Barker, and William D. Cochran *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 151-152 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03B

Observations of Comet P/Schwassmann-Wachmann 1 (SW1) during one observing run each in 1989 and 1990 are discussed, and the new significant information that was obtained is presented. Also discussed are near-UV observations of comets. The near-UV is a mostly unexplored spectral region for comets since it is not visible to spacecraft such as IUE and most ground-based detectors and spectrographs are not sensitive in the near-UV. Author

N92-12865*# McDonald Observatory, Austin, TX.
THE COMPANION OBJECT TO HD114762
William D. Cochran *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 153-154 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03A

We obtained 28 independent radial velocity measurements on the star HD114762, and are now able to derive orbit solution. We confirm the existence of a companion object in an orbit with a semimajor axis about 0.4 au. The new orbit solution is discussed. The result show that the companion is not a planet, but instead is a brown dwarf or a low mass star in a system viewed nearly pole-on. Author

N92-12866*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, CA.
DETECTION OF SOLID C(TRIPLE BOND)N BEARING MATERIALS ON SOLAR SYSTEM BODIES Abstract Only
Dale P. Cruikshank, W. K. Hartmann, David J. Tholen, L. J. Allamandola, R. H. Brown, C. N. Matthews, and J. F. Bell *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 155 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03A

We found observational evidence for the presence of C(triple bond)N-bearing solid materials on four classes of Solar System bodies: comets, asteroids, the rings of Uranus, and Saturn's satellite Iapetus. Gaseous CN was known in comet spectra, and the IR spectra of Comet P/Halley show emission of the CN fundamental at 4.5 microns interpreted as solids containing CN- group in the grains of the inner coma. The presented data offer the first evidence for chemically related material on the other objects. Author

N92-12867*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, MD.
STUDIES OF THERMAL WAVE PHENOMENA ON THE JOVIAN PLANETS Abstract Only **c91**
Drake Deming *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 156 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03B

Ground-based and Voyager observations of Jupiter provided evidence that the tropospheric temperature shows global-scale longitudinal variations which are often wavelike in character. The investigation is presented which is directed toward obtaining additional ground-based data in IR spectral bands whose contribution functions are optimized for specific atmospheric regions, in order to confirm the previous results, and to identify the nature and physical significance of wavelike longitudinal temperature fluctuations on the Jovian planets. Author

N92-12868*# Arizona Univ., Tucson.
DISCOVERY OF NEAR-EARTH ASTEROIDS BY CCD SCANNING
Tom Gehrels, Robert S. McMillan, M. L. Perry, D. L. Rabinowitz, and J. V. Scotti *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 157 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03A

The found near-Earth asteroid are different objects with peculiar

orbits. With the new technique of CCD scanning we entered the domain of the smallest, the fastest, and the closest near-Earth asteroids. The results are presented. Author

N92-12869*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
PALOMAR PLANET-CROSSING ASTEROID SURVEY (PCAS) JANUARY 1990 - FEBRUARY 1991 Abstract Only
Eleanor F. Helin *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 158 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03A

Several of our near-Earth asteroid (NEA) discoveries made relatively close approaches to the Earth allowing successful radar observations to be made. Detection of echoes from these asteroids provides otherwise unavailable information about their physical properties. Also, our role in alerting radar astronomers about new candidate asteroids makes it possible for them to acquire critical astrometry which improves the orbital elements of the new discovery. Author

N92-12870*# Wyoming Univ., Laramie.
INFRARED SPECKLE INTERFEROMETRY AND SPECTROSCOPY OF IO c91
Robert R. Howell *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 159-160 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03B

Observations of a series of mutual events of the Galilean satellites occurring in early 1991 are providing high resolution information concerning the volcanic hot spots on Jupiter's moon Io. The brightness of Io is plotted as a function of time as it is occulted by Europa. Voyager derived globes are given and interpreted, giving special attention to observed hot spots. Author

N92-12871*# Arizona Univ., Tucson.
PROBING TITAN'S ATMOSPHERE WITH A STELLAR OCCULTATION c91
W. B. Hubbard *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 161 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03B

The 3 July, 1989 occultation of 28 Sgr by Titan is discussed. The star was readily detectable throughout the occultation, reaching a minimum normalized flux of about 0.05. The occultation probed Titan's atmosphere in a region not studied by the Voyager spacecraft. The region is important for the aerobraking of Titan entry probes, and direct information about its properties is important for the Cassini mission. Occultation data (normalized stellar flux vs universal time) is shown in chart form for NASA supported stations, along with data from a collaborating group at the Wise observatory in Israel. Strong scintillation data of the star is noticeable in the data records, and provides information on waves/turbulence in Titan's high atmosphere. Author

N92-12872*# California Univ., Davis.
LABORATORY SIMULATION OF THE SURFACE OF HALLEY'S COMET Abstract Only c90
William M. Jackson *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 162 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03B

In the past year we have developed a model for the dissociation of icy grains in comets. In general, this model does not predict the radical yield that is observed in the jets of comets. To reproduce these yields, the concentration of the radical's precursors will have to be too high to be consistent with the abundance that we expect in comets. We have also constructed a theoretical model for the formation of ions on icy cometary grains. That model shows that only a small number of the cometary ions could be produced as ions in icy grains if the particle has only positively charged ions. If it contains both positive and negative ions then it could have a higher concentration of ions without violating charge neutrality. When such a particle evaporates, it can release ions with both charges into the gas phase. These ions could produce radicals via dissociative recombination with electrons if they are positive ions or by photoattachment of electrons if they are negative electrons. Finally, an avalanche process involving the acceleration of electrons towards charged particles is evaluated. It is shown that this will not lead directly to gas phase ions, but it might lead to additional ionization and dissociation on the grain. Author

N92-12873*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
GOLDSTONE SOLAR SYSTEM RADAR c91
Raymond F. Jurgens *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 163-164 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03B

Caltech/Jet Propulsion Laboratory (JPL) radar astronomers made use of the Very Large Array (VLA) at Socorro, NM, during February 1990, to receive radio echoes from the planet Venus. The transmitter was the 70 meter antenna at the Goldstone complex northwest of Barstow, CA. These observations contain new information about the roughness of Venus at cm to decimeter scales and are complementary to information being obtained by the Magellan spacecraft. Asteroid observations are also discussed. Author

N92-12874*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, MD.
TIME-LAPSE CCD IMAGERY OF PLASMA-TAIL MOTIONS IN COMET AUSTIN c90
Daniel A. Klinglesmith, III, Malcolm B. Niedner, Jr., R. J. Oliversen, and David J. Westpfahl *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 165-166 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03B

The appearance of the bright comet Austin 1989c1 in April-May of 1990 allowed us to test a new imaging instrument at the Joint Observatory for Cometary Research (JOCR). It is a 300mm lens/charge coupled device (CCD) system with interference filters appropriate for cometary emissions. The 13 frames were made into a time-lapse movie showing the evolution of the plasma tail. We were able to follow at least two large-scale waves out through the main tail structure. During the sequence, we saw two new tail rays form and undergo similar wave motion. Author

N92-12875*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, MD.
GROUND BASED INFRARED MEASUREMENTS OF THE GLOBAL DISTRIBUTION OF OZONE IN THE ATMOSPHERE OF MARS Abstract Only c91
Theodor Kostiuk, F. Espenak, M. J. Mumma, and D. Zipoy (Maryland Univ., College Park.) *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 167 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03B

The global distribution of ozone in the atmosphere of Mars was determined from Doppler-limited infrared heterodyne spectroscopy measurements at the NASA Infrared Telescope Facility (IRTF) facility during June 3-7, 1988. Mars spectra near two O3 lines arising from the v sub 3 band near 1031.45 cm (-1) were used. The lines were Doppler shifted out of the strong terrestrial ozone absorption spectrum and its effect was removed. Ozone measurements were obtained at eight beam positions over a range of latitudes and local solar zenith angles. The beam size of the planet was 1.4 arcsec. A Martian CO2 line appeared in the spectra and was inverted to retrieve local temperature profiles. Using these temperature profiles, the total ozone column abundance at each position was retrieved by fitting the measured line with synthetic spectra generated by a radiative transfer program. The only previous measurement of ozone at this season was made above the South polar cap by Mariner 7 and revealed an abundance of 10 micron-atm. However, the retrieved O3 column

abundances from this investigation are less than 2.2 micron-atm at all positions sampled. These results are consistent with mid-spring abundances predicted by photochemical models of Liu and Donahue, and Shimazaki and Shimizu. Author

N92-12876*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, MD.
ETHYLENE LINE EMISSION FROM THE NORTH POLE OF JUPITER Abstract Only **c91**
Theodor Kostiuk, F. Espenak, P. Romani, and J. Goldstein *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 168 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03B

A significant enhancement in infrared emission from hydrocarbon constituents of Jupiter's stratosphere was observed at a north polar hot spot (60 degrees latitude, 180 degrees longitude). A unique probe of this phenomena is ethylene (C2H4), which has not been observed previously from the ground. The profile of the emission line from ethylene at 951.742 cm-1, measured near the north pole of Jupiter, was analyzed to determine the morphology of the enhancement, the increase in C2H4 abundance and local temperature, as well as possible information on the altitude (pressure regions) where the increased emission is formed. Measurements were made using infrared heterodyne spectroscopy at the NASA Infrared Telescope Facility on Mauna Kea, Hawaii in December 1989. At 181 degrees longitude a very strong emission line was seen, which corresponds to a 13-fold increase in C2H4 abundance or a 115K increase in temperature in the upper stratosphere, compared to values outside the hot spot. The hot spot was found to be localized to approx. 10 degrees in longitude; the line shape (width) implied that the enhanced emission originated very high in the stratosphere. Author

N92-12877*# Arizona Univ., Tucson.
STORM ON SATURN **c91**
Stephen M. Larson *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 169 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03B

In September 1990, a white spot appeared on Saturn's atmosphere, which later spread over the entire equatorial region. The accompanying images were obtained as part of an effort to refine techniques for obtaining high resolution groundbased charge coupled device (CCD) images of the planets, and show the turbulent disturbance in Saturn's atmosphere. These broad red-band CCD images were obtained in November 1990 with the Catalina 1.5 m telescope. The planet was low in the sky at sunset, but the viewing was good enough to show detail in the equatorial region over all longitudes. Visibility of the features is enhanced by digital spatial filtering techniques. A storm of this magnitude has not been seen on Saturn since 1933. Author

N92-12878*# Arizona Univ., Tucson.
VISUAL AND NEAR-IR SPECTROPHOTOMETRY OF ASTEROIDS Abstract Only
Larry A. Lebofsky *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 170 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03A

We have been continuing our studies of the spectral properties of dark asteroids in the solar system. From these studies we expect to learn about the distribution of volatile materials, such as water in clay materials (water of hydration) and how the asteroids may relate to the comets. Our most recent work has been concentrating on simultaneous visual and near infrared photometry near Earth, main belt, and trojan asteroids. We have made observations of some unusual asteroids such as Chiron, which has recently shown cometary activity, and 944 Hidalgo, which has a comet-like orbit. We have also begun studies of the small, dark satellites of Mars and Jupiter in order to understand better how they may relate to the steroids. Could they actually be captured asteroids or comets? Author

N92-12879*# Lowell Observatory, Flagstaff, AZ.
DEUTERIUM ON VENUS: OBSERVATIONS FROM EARTH Abstract Only **c91**
Barry L. Lutz, C. deBergh, B. Bezard, T. Owen, D. Crisp, and J.-P. Maillard *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 171 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03B

In view of the importance of the deuterium-to-hydrogen ratio in understanding the evolutionary scenario of planetary atmospheres and its relationship to understanding the evolution of our own Earth, we undertook a series of observations designed to resolve previous observational conflicts. We observed the dark side of Venus in the 2.3 micron spectral region in search of both H2O and HDO, which would provide us with the D/H ratio in Venus' atmosphere. We identified a large number of molecular lines in the region, belonging to both molecules, and, using synthetic spectral techniques, obtained mixing ratios of 34 plus or minus 10 ppm and 1.3 plus or minus 0.2 ppm for H2O and HDO, respectively. These mixing ratios yield a D/H ratio for Venus of D/H equals 1.9 plus or minus 0.6 times 10 (exp 12) and 120 plus or minus 40 times the telluric ratio. Although the detailed interpretation is difficult, our observations confirm that the Pioneer Venus Orbiter results and establish that indeed Venus had a period in its early history in which it was very wet, perhaps not unlike the early wet period that seems to have been present on Mars, and that, in contrast to Earth, lost much of its water over geologic time. Author

N92-12880*# California Inst. of Tech., Pasadena.
NEAR INFRARED IMAGING OF THE OUTER PLANETS Abstract Only
K. Matthews and B. T. Soifer *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 172 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03A

In the last year we have continued our program of near infrared imaging of the outer planets of the solar system. Uranus is virtually invisible at 2.3 microns, showing that the methane is an effective absorber of the incident sunlight and that there is very little aerosol content in the upper atmosphere. On the other hand, Neptune shows a haze present over the entire Northern Hemisphere at 2.3 microns. This leads to the inference that there is an aerosol layer at a high altitude. We have recovered the Neptune satellite, 1989 N1, which was first discovered in Voyager images. The satellite is exceedingly faint in the near infrared, and was detectable only because the planet itself was comparatively faint at this wavelength. Observations of this satellite, coupled with the Voyager images, permit us to substantially refine the satellite's orbit, and hence carefully probe the gravitational field of Neptune. Author

N92-12881*# Hawaii Univ., Honolulu.
OUTBURST OF COMET HALLEY AT 14.3 AU Abstract Only **c90**
Karen J. Meech *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 173 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03B

Observations of comet Halley on February 15, 1991 showed that the comet had undergone a tremendous outburst in brightness sometime before the past month. At the time of the observation, the comet was at a heliocentric distance, R of 14.3 AU, and the expected nuclear magnitude was near 25.4 in the .m sub R bandpass. The comet was observed to have an extensive dust coma, extending at least 300,000 km in diameter towards a position angle of 135 degrees. The anti-solar direction was at a position angle of 27 degrees. The brightness of the comet within a 5 arcsec aperture was approximately 20.2, and the total brightness of the nucleus and coma is estimated near 17. An effective exposure of 4.75 hours shows that the coma is well defined with a brightness enhancement at the outer edge. The last observations of the comet were obtained during April 1990 with the Cerro Tololo 4m telescope when the comet was at a distance, R of 12.75 AU.

At that time the comet had reached its expected nuclear brightness of 24.9 and there was no evidence of activity. This new episode of activity in the comet is most likely caused by sublimation of a more volatile species than water, for example CO or CO2, which had built up sufficient pressure beneath the dust mantle to initiate an outburst. Continued monitoring of the comet is planned to observe the evolution of the dust coma. Measurements of the expansion velocity may suggest which volatile was responsible for the activity. Author

N92-12882*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
ASTEROID 1986 DA: RADAR EVIDENCE FOR A METALLIC COMPOSITION Abstract Only **c90**
Steven J. Ostro, D. B. Campbell, J. F. Chandler, A. A. Hine, R. S. Hudson, K. D. Rosema, and Irwin I. Shapiro (Smithsonian Astrophysical Observatory, Cambridge, MA.) *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 174 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03B

Radar observations of the near-Earth asteroid 1986 DA were carried out at the Arecibo Observatory in April 1986, two months after its discovery. Radar results are consistent with the hypothesis that 1986 HA is a piece of NiFe metal derived from the interior of a much larger object that melted, differentiated, cooled and subsequently was disrupted in a catastrophic collision. This 2-km asteroid might be (or have been part of) the parent body of some iron meteorites. Or 1986 DA might share the parentage and/or part of the dynamical history of some meteorites without ever having contributed any of its own ejecta to our meteorite sample. Analysis of the samples returned from 1986 DA might ultimately involve economic considerations. Meteoritic metal is mostly iron with about 8 percent nickel, but also contains substantial concentrations of precious and strategic metals, including approx. 1 ppm of gold and approx. 10 ppm of platinum group elements. If these abundances apply to 1986 DA, it contains some 10(exp 16) g of iron, 10 (exp 15) g of nickel, 10(exp 11) g of platinum group metals, and 10(exp 10) g of gold. Author

N92-12883*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
IO'S RADAR PROPERTIES **c91**
Steven J. Ostro, D. B. Campbell, J. F. Chandler, Irwin I. Shapiro (Smithsonian Astrophysical Observatory, Cambridge, MA.), and K. D. Rosema *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 175 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03B

Arecibo 13 cm wavelength radar observations during 1987-90 have yielded echoes from Io on each of 11 dates. Whereas Voyager imaged parts of the satellite at resolutions of several km and various visible/infrared measurements have probed the surfaces's microscale properties, the radar data yield new information about the nature of the surface at cm to km scales. Our observations provide fairly thorough coverage and reveal significant heterogeneity in Io's radar properties. A figure is given showing sums of echo spectra from 11 dates. Author

N92-12884*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.
SODIUM AND POTASSIUM IN THE LUNAR ATMOSPHERE Abstract Only **c91**
A. E. Potter and T. H. Morgan *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 176 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03B

The discovery that sodium and potassium vapor can be observed in the lunar atmosphere using ground-based telescopes has opened up a field of investigation that was closed after the last Apollo mission to the Moon. Sodium has been detected at altitudes up to 1500 km above the surface. This implies a high effective temperature for sodium, of the order of 1000 K. However, there is some evidence for two populations of sodium and potassium, one at temperatures corresponding to the surface, and another corresponding to high temperatures. The sources for the lunar atmosphere are not understood. Meteoric bombardment of the surface, solar wind sputtering of the surface, and photo-sputtering of the surface have all been suggested as possible sources for the lunar atmosphere. One of the objectives of the current research is to test different hypotheses by measurements of the atmosphere under different conditions of solar illumination and shielding from the solar wind by the Earth. Author

N92-12885*# Massachusetts Univ., Amherst.
RADIATIVE TRANSFER IN PLANETARY ATMOSPHERES: SUBMILLIMETER-WAVE SPECTROSCOPY OF COMETS Abstract Only **c91**
F. Peter Schloerb *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 177 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03B

During 1990, a significant step was made in asertaining the molecular composition of comets by our Planetary Astronomy group at the University of Massachusetts. We obtained several exciting new detections of submillimeter wave spectral lines from molecules in the coma of Comet Levy (1990c) using the 10m telescope of the Caltech Submillimeter Observatory, located on Mauna Kea. The molecules HCN, formaldahyde, and methanol were all detected in abundances that make them important minor constituents of the nucleus. Moreover, the emission was so strong that, for the first time, it was possible to map the distribution of these species in the coma and study their behavior as they flow outwards from the nucleus. Author

N92-12886*# Smithsonian Astrophysical Observatory, Cambridge, MA.
RADAR STUDIES IN THE SOLAR SYSTEM Abstract Only
Irwin I. Shapiro *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 178 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03A

We are actively engaged in observations of asteroids and comets, both as planned targets and as targets of opportunity. The most recent example of the latter is asteroid 1991 AQ, which was discovered optically on January 14, 1991 and found to be rapidly nearing Earth. Due in part to our previous success in obtaining useful radar data on short notice, we were able to schedule time on the Arecibo radar on January 28-31, when the asteroid was within the Arecibo declination window. Each day during the period, a fresh ephemeris was made including all available data, both optical and radar. With further processing, the results of the observations are expected to include detailed two-dimensional images of the asteroid and information on its surface properties, size, shape and spin. The observing program also included two other asteroids, two of the four Galilean satellites of Jupiter, the satellites of Mars, and the planet Mercury. Analysis of newly available radar observations of Venus has led to a refinement of the spin vector of that planet and has thereby provided a coordinate basis for the Magellan spacecraft mapping mission. Author

N92-12887*# Illinois Univ., Urbana.
OBSERVATIONS OF FORMALDEHYDE AND SEARCH FOR CYANOACETYLENE IN COMET BRORSEN-METCALF (1988o) Abstract Only **c90**
Lewis E. Snyder, Patrick Palmer, and I. dePater *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 179 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03B

The Very Large Array (VLA) was used in September 1989 to search Comet P/Brorsen-Metcalf (1989o) for the 1 sub 11-1 sub 10 transition of formaldehyde (H2CO) at 4,829.659 MHz and for the J equals 1-0, F equals 2-1 rotational transition of cyanoacetylene (HC3N) at 9098.3321 MHz. A new technique was used in reducing the data. Data blocks which were either 3x3 pixels, 5x5 pixels, or 9x9 pixels were examined for a signal from

H2CO. Using this approach, different pixel clusters within the field of view can be sampled to optimize the coupling of the synthesized beam to the gas distribution. HC3N is of immediate interest as a cometary molecule because it may be a reservoir of carbon and a source of cometary CN. Our search for HC3N emission at 3.3 cm wavelength demonstrated that for this molecule the VLA can be expected to reach significant levels of sensitivity in many comets. Author

N92-12888*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
ASTEROID ABSOLUTE MAGNITUDES AND SLOPE PARAMETERS Abstract Only **c91**
Edward F. Tedesco *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 180 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03B

A new listing of absolute magnitudes (H) and slope parameters (G) has been created and published in the Minor Planet Circulars; this same listing will appear in the 1992 Ephemerides of Minor Planets. Unlike previous listings, the values of the current list were derived from fits of data at the V band. All observations were reduced in the same fashion using, where appropriate, a single basis default value of 0.15 for the slope parameter. Distances and phase angles were computed for each observation. The data for 113 asteroids was of sufficiently high quality to permit derivation of their H and G. These improved absolute magnitudes and slope parameters will be used to deduce the most reliable bias-corrected asteroid size-frequency distribution yet made. Author

N92-12889*# Hawaii Univ., Honolulu.
THE YEAR 1990 MARKS END OF PLUTO-CHARON MUTUAL EVENT SEASON
David J. Tholen *In* NASA, Washington, Reports of Planetary Astronomy, 1990 Oct. 1991 p 181-182 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03A

From late 1984 until late 1990, the orbit of Pluto's satellite Charon was sufficiently close to an edge-on configuration, as seen from Earth, to produce transit, occultation, and eclipse events involving the two objects. The systematic observation of these events, each of which offers a unique geometry of Pluto, Charon and shadow, has been used to directly measure several parameters of the system. With data now available from the entire mutual event season, reliable values for the radii of Pluto and Charon can be derived. Pluto's radius is 0.05860 plus or minus 0.00031, in units of Chiron's mean orbital radius, and Charon's radius is 0.03019 plus or minus 0.00066, in the same units. Author

N92-12890*# Hawaii Univ., Honolulu.
FIRST SPACECRAFT ENCOUNTER WITH AN ASTEROID APPROACHES **c90**
David J. Tholen *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 183 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03B

During the course of the Galileo spacecraft's journey to Jupiter it will make two excursions through the steroid belt situated between Mars and Jupiter. The first excursion involves an encounter with the asteroid 951 Gaspra, which will take place on October 29, 1991. Gaspra is a small (about 15 km diameter) asteroid near the outer edge of the main asteroid belt. It's spectral classification is S, suggesting a composition similar to those of stony-iron meteorites. A figure is given showing the brightness of this asteroid as a function of time. Author

N92-12891*# Texas Univ., Austin.
GLOBAL SCALE AURORAL EMISSIONS ON JUPITER Abstract Only **c91**
L. Trafton *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 184 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03B

Jupiter's aurora are normally confined to limited regions around the magnetic poles. Our collected spectra show that very unusual periods of global scale auroral activity occurred during September and November of 1988. During the global scale events, the H2 and H3(+) emissions remained confined to their unusual auroral zones, but strong, unidentified emissions appeared in the vicinity of the H2 quadrupole lines. This would suggest that unusual periods of widespread magnetospheric dumping occurred. Author

N92-12892*# Texas Univ., Austin.
TENTATIVE IDENTIFICATION OF A NEWLY DISCOVERED CLASS OF MATERIAL ON IO Abstract Only **c91**
L. Trafton *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 185 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03B

A newly discovered absorption feature in Io's spectrum at 2.1253 microns promises to reveal significant insights in the nature of the interaction among Io's surface, atmosphere, and volcanoes. The most likely candidate for this feature appears to be clusters of CO2 molecules. Observations are underway on a current series of occultations and eclipses of Io by other Galilean satellites in order to locate the source of this newly discovered material on Io, which should provide further clues to its origin. Author

N92-12893*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.
COMPOSITIONAL STUDIES OF PRIMITIVE ASTEROIDS Abstract Only **c90**
Faith Vilas *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 186 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03B

Primitive asteroids in the solar system (C, P, D class and associated subclasses) are believed to have undergone less thermal processing compared with the differential (S class) asteroids. Telescopic spectra of C class asteroids show effects of aqueous alteration products produced when heating of the asteroids was sufficient to melt surface water, but not strong enough to produce differentiation. Spectrum analysis of P and D class asteroids suggests that aqueous alteration terminated in the outer belt and did not operate at the distance of Jupiter's orbit. Author

N92-12894*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
ASTROMETRIC OBSERVATIONS OF COMETS AND MINOR PLANETS Abstract Only
J. G. Williams and J. Gibson *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 187 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03A

Comets and planet crossings are observed so that accurate positions can be determined. The observations are made with the Palomar 1.5m telescope equipped with a charge coupled device (CCD) array. This combination is quite efficient at recording faint comets and minor planets. This proves quite useful for early acquisition of comets and asteroids returning for a new opposition. The resulting positions permit accurate orbits to be determined and allow the properties of the comets and asteroids to be measured by other observers using a variety of techniques. Recoveries and other notable observations of comets and planet crossing asteroids observed during the past year are discussed. Author

N92-12895*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
MINOR PLANET 1566 ICARUS: ASTEROID OR COMET? Abstract Only **c90**
Donald K. Yeomans *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 188 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03B

By employing a cometary nongravitational force model, based

on the outgassing of a water ice nucleus, the orbital fits to the optical and radar astrometric data are improved for both Apollo and Icarus. A reliable value for the magnitude of these nongravitational effects can be determined for Icarus, but not Apollo. Because Icarus is less than a kilometer in extent, the small amount of outgassing required to explain its anomalous orbital behavior would probably not be sufficient to create an easily visible coma. While these results do not prove that 1566 Icarus is an active comet masquerading as an asteroid, this object certainly deserves future scrutiny to determine its true identity. A near-Earth asteroid showing cometary activity must represent only the tip of a much larger cometary iceburg. For such an object whose aphelion is well inside Jupiter's orbit, the time scale for losing its volatiles is much shorter than the time scale for evolving out of the inner solar system. Thus, for each active member of the near-Earth asteroid population, there must be many more that are temporarily or permanently inactive. Author

N92-12945*# Academy of Sciences (USSR), Moscow. Lebedev Physical Inst.
RADIO TELESCOPES AS THE DETECTORS OF SUPER-HIGH-ENERGY NEUTRINOS
R. D. Dagkesamansky and I. M. Zheleznykh *In* NAS-NRC, High-Energy Astrophysics. American and Soviet Perspectives 1991 p 87-90 (For primary document see N92-12933 03-90)
Avail: NTIS HC/MF A18 CSCL 03A

N92-12946*# California Univ., Berkeley.
OPTICAL OBSERVATIONS OF ACTIVE GALACTIC NUCLEI
Alexei V. Filippenko *In* NAS-NRC, High-Energy Astrophysics. American and Soviet Perspectives 1991 p 91-107 (For primary document see N92-12933 03-90)
Avail: NTIS HC/MF A18 CSCL 03A

N92-12948*# Space Telescope Science Inst., Baltimore, MD.
CLUSTER RESEARCH WITH X RAY OBSERVATIONS
Riccardo Giacconi and Richard Burg *In* NAS-NRC, High-Energy Astrophysics. American and Soviet Perspectives 1991 p 112-133 (For primary document see N92-12933 03-90)
Avail: NTIS HC/MF A18 CSCL 03A

N92-12955*# Abastumani Astrophysical Observatory, Georgia (USSR).
GEORGIAN SPACE RESEARCH PROGRAM
G. P. Kakhidze *In* NAS-NRC, High-Energy Astrophysics. American and Soviet Perspectives 1991 p 218-224 (For primary document see N92-12933 03-90)
Avail: NTIS HC/MF A18 CSCL 03A

N92-12957*# Harvard-Smithsonian Center for Astrophysics, Cambridge, MA.
OBSERVING SN 1987A WITH THE INTERNATIONAL ULTRAVIOLET EXPLORER
Robert P. Kirshner *In* NAS-NRC, High-Energy Astrophysics. American and Soviet Perspectives 1991 p 237-250 (For primary document see N92-12933 03-90)
Avail: NTIS HC/MF A18 CSCL 03A

90 ASTROPHYSICS

Includes cosmology; celestial mechanics; space plasmas; and interstellar and interplanetary gases and dust.

For related information see also *75 Plasma Physics*.

N92-12896 Colorado Univ., Boulder.
PHOTOIONIZATION OF INTERGALACTIC GAS AND COOLING FLOWS IN CLUSTERS OF GALAXIES Ph.D. Thesis
Megan Elizabeth Donahue 1990 190 p
Avail: Univ. Microfilms Order No. DA9123441

We examine the environmental impact of quasars on the intergalactic medium (IGM) and derive analytic and numerical results for ionization-front expansion as a function of redshift z in an expanding Friedmann cosmology. We find that in order for the IGM to be ionized by quasars, the closure parameter of intergalactic gas, omega(sub I) is less than .03. We present new photoionization models (using updated Opacity Project photoionization cross sections for C, N, O, and Si) of optically thin, low-density intergalactic gas clouds at constant pressure, photoionized by QSOs. We model all ion stages of H, He, C, N, O, Si, and iron, and predict the column density ratios of clouds at specified values of ionization parameter and metallicity. We also examine whether H2 cooling or photoelectron escape can explain recent line-width observations by Pettini et al. (1990) that suggest low temperatures in some Ly(alpha) clouds. In order to discover cooling gas in the dominant galaxy in x-ray emitting clusters of galaxies, we have optically observed a complete, x-ray selected sample of 23 distant clusters of galaxies extracted from the Einstein Extended Medium Sensitivity Survey. We find luminous extended H(alpha) emission in 11 of these clusters. Since this cooling gas is a signature of a massive cooling flow, we have discovered new cooling flow clusters in a distant sample of previously unknown clusters. We present the detailed predictions of a photoionization model introduced by Voit and Donahue (1990) explaining the source of optical line emission associated with cooling flows in clusters of galaxies. Dissert. Abstr.

N92-12897 Oxford Univ. (England).
CATACLYSMIC VARIABLES IN GLOBULAR CLUSTERS AND LOW MASS X RAY BINARIES Ph.D. Thesis
Graham Machin 1990 223 p
Avail: Univ. Microfilms Order No. BRD-92705

An introduction is given to cataclysmic variables (CVs), low mass x-ray binaries (LMXBs) and globular clusters. The radio properties of LMXBs are reviewed. I present optical spectroscopy and photometry of the globular cluster CV candidates, V4 in M30, V101 in M5, the CV candidates in M71 and of the LMXB 4U0614 + 09. VLA observations of the globular cluster x-ray sources in NGC7078, NGC6712, NGC6624 and NGC1851 and a snapshot of the galactic LMXB 4U2129 + 47 are presented. The quiescent colors of V4 indicate that its orbital period is less than 5 hours. Its radial velocity, quiescent and outburst magnitudes show that it is probably not a cluster member. A hump in the light curve of V101, its quiescent colors, outburst magnitude and the results of quiescent state time resolved spectroscopy are all consistent with an orbital period of approx. 5-8 hours. V101 is the only CV whose photometric properties are compatible with cluster membership. Spectroscopy of the two brightest CV candidates in M71 shows that they are subdwarf B stars. The nature of the remaining candidates is discussed. Radio counterparts to the x-ray sources in NGC7078 and NGC6712 are discovered. The observed emission is interpreted in terms of the synchrotron emission mechanism. Upper limits are placed on radio emission from the x-ray sources in NGC6624 and NGC1851 and from the galactic LMXB 4U2129 + 47. The 4U0614 + 09 displays photometric variability on two timescales; 10 days and 1 hour. The former is interpreted as a precessing accretion disc whilst the latter could be either long timescale QPO or the orbital period. The optical spectrum is unusual because it only displays the Bowen blend (lambda 4640-4600) emission feature not He II lambda 4686. Possible explanations for this behavior are discussed. Simultaneous optical and x-ray photometry shows that the optical flux was anticorrelated with the x-ray emission. Dissert. Abstr.

N92-12898 California Univ., Los Angeles.
A THREE-DIMENSIONAL MODEL FOR MOLECULAR CLOUD COLLAPSE AND PROTOSTELLAR FORMATION Ph.D. Thesis
Elizabeth Anne Myhill 1991 285 p
Avail: Univ. Microfilms Order No. DA9122732

A three dimensional Cartesian code was developed to model molecular cloud collapse and protostellar formation. The basic Eulerian scheme employs second-order accurate finite difference methods to advance the fluids variables in time. The hydrodynamic equation governing the collapse contain the effects of self-gravity, rotation, and radiative transfer. Poisson's equation is solved with Green's functions and Fourier transforms, and the Eddington approximation is used to handle radiative transfer. Six collapse

calculations were made of initially centrally condensed molecular cloud cores. Two initial density profiles, rho alpha gamma(exp -1) and rho alpha gamma(exp -2), were considered. Half of the clouds began the collapse with solid body rotation, while the rest of the models were assigned a differential rotation profile consistent with conservation of angular momentum during core condensation. The results indicate that fragmentation is possible in molecular cloud cores which begin gravitational collapse with rho(exp -1) or rho(exp -2) density distributions if the initial conditions also include differential rotation. Cores which collapse with initial uniform rotation, however, do not appear to produce binary fragments. Hence if molecular cloud cores are indeed centrally condensed, as suggested by observations of star forming regions and by studies of ambipolar diffusion, then differential rotation may be necessary if binary protostars are to be produced during gravitational collapse. The nonisothermal scheme employs Rosseland mean opacities throughout the collapse calculations. Two models were run to evaluate the effect of using Planck opacities, rather than Rosseland values, for the optically thin regions of the protostellar cloud.
Dissert. Abstr.

N92-12899 Maryland Univ., College Park.
NONTHERMAL SYNCHROTRON PAIR CASCADES IN STRONG MAGNETIC FIELDS: A GAMMA RAY BURST EMISSION MODEL Ph.D. Thesis
Robert Dwight Preece 1990 167 p
Avail: Univ. Microfilms Order No. DA9121409

There are several indications that the astrophysical phenomenon of gamma-ray bursts (GRB) may arise in the strong (greater than or equal to 2 x 10(exp 12) G) magnetic field environment of a neutron star. The presence of a strong magnetic field changes the behavior of most radiative processes significantly, yet for the purpose of spectral fitting these effects have yet to be systematically quantified. Thermal emission models of GRBs have difficulty accounting for the hardness of the observed gamma ray emission, which may typically have power-law behavior above 1 Million electron Volts (MeV). Incorporating the correct strong field physics, an emission model which is able to accept a large variety of thermal and nonthermal energetic particle distributions as input has been developed. The calculation uses the Monte Carlo technique to simulate synchrotron emission by energetic particles in the strong field and the subsequent pair production by the emitted radiation, which results in a synchrotron pair cascade. Also employed is the Fokker-Planck equation to solve for the steady-state particle distribution functions in the ground state. This work leads to a study of quantum synchrotron emission, resonant Compton scattering and pair annihilation in strong magnetic fields. The resulting annihilation line is narrow due to the fact that both synchrotron radiation losses and multiple Compton scatterings have cooled particles in the ground state on timescales shorter than annihilation. The pairs come into equilibrium with the photons at an energy which is comparable to the cyclotron energy, and form a peak at that energy which has a width of the same magnitude.
Dissert. Abstr.

N92-12900 Carnegie-Mellon Univ., Pittsburgh, PA.
PROSPECTS IN EXTENDED INFLATION Ph.D. Thesis
Yun Wang 1991 152 p
Avail: Univ. Microfilms Order No. DA9123521

The various aspects are explored in making a successful model of extended inflation, which should solve all the problems of the Standard Cosmology without creating new ones. Extending inflationary models are based on Brans-Dicke like theories. In the extended inflationary scenario, inflation occurs when the inflation field is trapped in a false vacuum and ends via the nucleation and percolation of true vacuum bubbles. The nucleation probability is studied of these true vacuum bubbles. It was found that in the context of extended inflation, the nucleation rate can have very strong time dependence through the time dependence of the Brans-Dicke like field; this can have a pronounced effect on the percolation of true vacuum bubbles. Physical constraints on generalized extended inflationary models are derived. It was found that there are sizable portions in the parameter spaces of these theories that allow for good extended inflation. The effects of higher order curvature terms on extended inflation are also examined. It was found that there must be an upper limit on the coupling strength of these terms, if they are not to spoil the good features of extended inflation.
Dissert. Abstr.

N92-12901*# Lunar and Planetary Inst., Houston, TX.
ABSTRACTS FOR THE 54TH ANNUAL MEETING OF THE METEORITICAL SOCIETY Abstracts Only
1991 320 p Meeting held in Monterey, CA, 21-26 Jul. 1991
(Contract NASw-4574)
(NASA-CR-188934; NAS 1.26:188934; LPI-Contrib-766) Avail: NTIS HC/MF A14 CSCL 03B

Abstracts of the papers presented at 54th Annual Meeting of the Meteoritic Society are compiled. The following subject areas are covered: Antarctic meteorites; nebula and parent body processing; primary and secondary SNC parent planet processes; enstatite chondrites and aubrites; achondrite stew; refractory inclusions; meteorite exposure ages and sizes; interstellar/meteorite connections; lunar origins, processes and meteorites; craters, cratering and tektites; cretaceous-tertiary impact(s); IDPs (LDEF, stratosphere, Greenland and Antarctica); chondrules; and chondrites. For individual titles, see N92-12902 through N92-12932.

N92-12902*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, CA.
INTERSTELLAR ORGANICS AND POSSIBLE CONNECTIONS WITH THE CARBONACEOUS COMPONENTS OF METEORITES AND IDPs Abstract Only
L. J. Allamandola *In* Lunar and Planetary Inst., Abstracts for the 54th Annual Meeting of the Meteoritical Society 1991 p 5 (For primary document see N92-12901 03-90)
Avail: NTIS HC/MF A14 CSCL 03B

Studying the chemical and isotopic composition of interstellar ice and dust provides insight into the composition and chemical history of the solid bodies in the solar nebula and the nature of the materials subsequently brought into the inner part of the solar system by comets and meteorites. It is now possible to probe the composition of these microscopic interstellar particles. High quality IR spectra of many different astronomical sources (some associated with dark molecular clouds, and others in the diffuse interstellar medium) are now available. Comparisons of these spectra with laboratory spectra and complex organic components of these materials are discussed.
Author

N92-12903*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, CA.
METHANOL IN THE SKY WITH DIAMONDS Abstract Only
L. J. Allamandola, S. A. Sandford, A. G. G. M. Tielens, and T. Herbst *In* Lunar and Planetary Inst., Abstracts for the 54th Annaul Meeting of the Meteoritical Society 1991 p 6 (For primary document see N92-12901 03-90)
Avail: NTIS HC/MF A14 CSCL 03B

The present of gas phase methanol in dense interstellar molecular clouds was established by radio detection of its rotational emission lines. However, the position, width, and profile of a absorption band near 1470 cm(exp -1) in the IR spectra of many dense molecular clouds strongly suggests that solid methanol is an important component of interstellar ices. In an attempt to better constrain the identification of 1470 cm(exp -1) feature, we began a program to search for other characteristic absorption bands of solid state methanol in the spectra of objects known to produce this band. One such feature is now identified in the spectra of several dense molecular clouds and its position, width, and profile fit well with those of laboratory H2O:CH3OH ices. Thus, the presence of methanol-bearing ices in space is confirmed.
Author

N92-12904*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, CA.
NEARBY MAIN SEQUENCE STARS WITH COOL CIRCUMSTELLAR MATERIAL Abstract Only
Dana E. Backman and Francesco Paresce (Space Telescope

Science Inst., Baltimore, MD.) *In* Lunar and Planetary Inst., Abstracts for the 54th Annual Meeting of the Meteoritical Society 1991 p 1 (For primary document see N92-12901 03-90)
Avail: NTIS HC/MF A14 CSCL 03B

The discovery of the so-called Vega phenomenon was one of the most important and unexpected results of the IRAS mission. Several nearby main sequence stars were found to possess clouds of solid grains emitting strongly in the far-IR. Three of these objects were marginally resolved by IRAS. This phenomenon appears to be widespread and not limited to proto-planetary epochs. Possible connection of this phenomenon to the existing of planets is discussed. Author

N92-12905*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.
DEGRADATION STUDIES OF MARTIAN IMPACT CRATERS Abstract Only **c91**
N. G. Barlow *In* Lunar and Planetary Inst., Abstracts for the 54th Annual Meeting of the Meteoritical Society 1991 p 1 (For primary document see N92-12901 03-90)
Avail: NTIS HC/MF A14 CSCL 03B

The amount of obliteration suffered by Martian impact craters is quantified by comparing measurable attributes of the current crater shape to those values expected for a fresh crater of identical size. Crater diameters are measured from profiles obtained using photoclinometry across the structure. The relationship between the diameter of a fresh crater and a crater depth, floor width, rim height, central peak height, etc. was determined by empirical studies performed on fresh Martian impact craters. We utilized the changes in crater depth and rim height to judge the degree of obliteration suffered by Martian impact craters. Author

N92-12906*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, CA.
CLATHRATE TYPE 2 HYDRATE FORMATION IN VACUO UNDER ASTROPHYSICAL CONDITIONS Abstract Only
D. F. Blake, L. J. Allamandola, S. A. Sandford, and F. Freund (San Jose State Univ., CA.) *In* Lunar and Planetary Inst., Abstracts for the 54th Annual Meeting of the Meteoritical Society 1991 p 2 (For primary document see N92-12901 03-90)
Avail: NTIS HC/MF A14 CSCL 03B

The properties of clathrate hydrates were used to explain the complex and poorly understood physical processes taking place within cometary nuclei and other icy solar system bodies. Most of all the experiments previously conducted used starting compositions which would yield clathrate types I hydrates. The main criterion for type I vs. type II clathrate hydrate formation is the size of the guest molecule. The stoichiometry of the two structure types is also quite different. In addition, the larger molecules which would form type II clathrate hydrates typically have lower vapor pressures. The result of these considerations is that at temperatures where we identified clathrate formation (120-130 K), it is more likely that type II clathrate hydrates will form. We also formed clathrate II hydrates of methanol by direct vapor deposition in the temperature range 125-135 K. Author

N92-12907*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.
Ar-39-Ar-40 OF ACHONDRITES: EVIDENCE FOR A LUNAR-LIKE CATACLYSM Abstract Only
D. D. Bogard and D. H. Garrison *In* Lunar and Planetary Inst., Abstracts for the 54th Annual Meeting of the Meteoritical Society 1991 p 2 Prepared in cooperation with Lockheed Engineering and Sciences Co., Houston, TX (For primary document see N92-12901 03-90)
Avail: NTIS HC/MF A14 CSCL 03B

The observation that the K-Ar, Pb-Pb, and Rb-Sr ages of a significant number of lunar highland rocks were reset in the interval of 4.1-3.8 Ga ago led to the concept of a cataclysmic bombardment of the moon during this period. An important consideration for understanding the early bombardment history of the solar system, including the moon, is whether evidence also exists in meteorites for resetting of radiometric ages by cataclysmic bombardment of their parent bodies. A comparison of Ar-39-Ar-40 ages of achondritic meteorites with ages of lunar highland rocks should help elucidate the nature of the early bombardment of the solar system. We are participating in various consortia studies of primarily Antarctic eucrites and howardites for which we measured Ar-39-Ar-40 ages of various clasts and matrix samples. The results of these studies are presented. Author

N92-12908*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.
AQUEOUS ALTERATION ON THE PARENT BODIES OF CARBONACEOUS CHONDRITES: COMPUTER SIMULATIONS OF LATE-STAGE OXIDATION Abstract Only
W. L. Bourcier and Michael E. Zolensky (Lawrence Livermore National Lab., CA.) *In* Lunar and Planetary Inst., Abstracts for the 54th Annual Meeting of the Meteoritical Society 1991 p 3 (For primary document see N92-12901 03-90)
Avail: NTIS HC/MF A14 CSCL 03B

CI carbonaceous chondrites may be products of hydrous alteration of CV- or anhydrous CM-type materials. The CIs typically contain veins filled with carbonates and sulfates, probably indicating a period of late stage aqueous alteration under oxidizing conditions. To test this idea, computer simulations of aqueous alteration of CV- and CM-type carbonaceous were performed. Simulations were restricted to the oxidation of hydrous mineral assemblages produced in previous simulations in order to determine whether further reaction and oxidation results in the phyllosilicate, carbonate, sulfate and oxide vein assemblages typical of CI carbonaceous chondrites. Our simulations were performed at 1, 25, 100, and 150 C (the appropriate temperature range) for the CV and CM mineral assemblages and using the computer code EQ3/6. Author

N92-12909*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.
MINERALOGY OF AN UNUSUAL Cr-RICH INCLUSION IN THE LOS MARTINEZ (L6) CHRONDRITIC BRECCIA Abstract Only
Adrian J. Brearley, Ignacio Casanova, M. L. Miller, and Klaus Keil (Hawaii Univ., Honolulu.) *In* Lunar and Planetary Inst., Abstracts for the 54th Annual Meeting of the Meteoritical Society 1991 p 3 (For primary document see N92-12901 03-90)
Avail: NTIS HC/MF A14 CSCL 03B

During the petrological study of the L6 chondritic breccia, Los Martinez, we discovered a large, highly unusual Cr-rich inclusion whose mineralogy appears to be unique in both terrestrial and extraterrestrial occurrences. We carried out electron microprobe, scanning electron microscopy, and transmission electron microscopy investigations of this inclusion in order to determine its composition and mineralogy in detail and to establish its origin and possible relationship to other Cr-rich objects in chondritic meteorites. Details of the chemical composition, origin, and thermal history are given. Author

N92-12910*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.
THE COMPOSITION OF METEOROIDS IMPACTING LDEF Abstract Only
D. E. Brownlee, Friedrich Horz, M. Laurance, R. P. Bernhard, J. Warren, and J. P. Bradley (McCrone Associates, Inc., Westmont, IL.) *In* Lunar and Planetary Inst., Abstracts for the 54th Annual Meeting of the Meteoritical Society 1991 p 3 (For primary document see N92-12901 03-90)
Avail: NTIS HC/MF A14 CSCL 03B

So far we have completed an initial scanning electron microscopy (SEM) survey of craters on the exterior of the Long Duration Exposure Facility (LDEF) in the 100 micron to 1mm size range and done some quantitative analysis. In typical craters, the residue appears to be a mixture of glass and FeNi and sulfide beads with an overall chondritic elemental composition. In less than 10 percent of the craters, there is a substantial amount of meteoroid debris that also contains unmelted mineral grains. The relatively high abundance of forsterite and enststite among these

irregular grains suggests that a high melting point probably plays a role in surviving impact without melting. Author

N92-12911*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.
DISTRIBUTION OF SILICON BETWEEN KAMACITE AND TAENITE Abstract Only
Ignacio Casanova *In* Lunar and Planetary Inst., Abstracts for the 54th Annual Meeting of the Meteoritical Society 1991 p 4 (For primary document see N92-12901 03-90)
Avail: NTIS HC/MF A14 CSCL 03B

Meteorites formed under highly reducing conditions can incorporate substantial amounts of Si in solid solution in their metallic phases. In enstatite meteorites, reduced Si appears in shreibersite, perryite and, in variable amounts, in the kamacite, taenite, and tetrataenite. Microprobe bulk analysis of Si in Fe,Ni particles of aubrites show a large variation from grain to grain; this large compositional range has been attributed to local equilibrium conditions in the specific T and/or fO2 environments in which they are formed. Si concentrations are homogeneous in the kamacite; in contrast, the Ni-rich phases (taenite and tetrataenite) show a characteristic Si profile. Concentrations of this element in tetrataenite are substantially higher than in the adjacent kamacite, and decrease smoothly towards the center of the taenite grain, matching very closely the M-shaped profile of Ni. Other elements with similar distribution patterns are Ge and Cu. A satisfactory explanation for this behavior cannot be given in the absence of experimental data for the diffusion of Si between alpha and gamma-Fe alloys. However, two end-member possibilities can be envisioned: the distribution of Si between kamacite and taenite may be controlled by (1) the crystallographic structure or (2) the chemical composition of the host phases. These possibilities are explored. Author

N92-12912*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, CA.
A GUIDE TO THE USE OF THEORETICAL MODELS OF THE SOLAR NEBULA FOR THE INTERPRETATION OF THE METEORITIC RECORD Abstract Only
Pat Cassen *In* Lunar and Planetary Inst., Abstracts for the 54th Annual Meeting of the Meteoritical Society 1991 p 4 (For primary document see N92-12901 03-90)
Avail: NTIS HC/MF A14 CSCL 03B

Attempts to derive a theoretical framework for the interpretation of the meteoritic record have been frustrated by our incomplete understanding of the fundamental processes that controlled the evolution of the primitive solar nebula. Nevertheless, it is possible to develop qualitative models of the nebula that illuminate its dynamic character, as well as the roles of some key parameters. These models draw on the growing body of observational data on the properties of disks around young, solar-type stars, and are constructed by applying the results of known solutions of protostellar collapse problems; making simple assumptions about the radial variations of nebular variables; and imposing the integral constraints demanded by conservation of mass, angular momentum, and energy. The models so constructed are heuristic, rather than predictive; they are intended to help us think about the nebula in realistic ways, but they cannot provide a definitive description of conditions in the nebula. Author

N92-12913*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.
LOW TEMPERATURE ANNEALING AND CATHODOLUMINESCENCE STUDIES OF TYPE 1 CHONDRULE COMPOSITIONS Abstract Only
John M. DeHart and Gary E. Lofgren *In* Lunar and Planetary Inst., Abstracts for the 54th Annual Meeting of the Meteoritical Society 1991 p 5 (For primary document see N92-12901 03-90)
Avail: NTIS HC/MF A14 CSCL 03B

Preliminary results indicate that the yellow luminescing mesostases in type I chondrules can be altered by the effects of the low level thermal metamorphism. Although heat alone was insufficient to alter the CL, reheating for geologically relevant periods could have the same results as we obtained in a second series of experiments with water present. It is known that both water and solutions of sodium metasilicate greatly accelerate the devitrification of glasses. The results of the experiments that will be repeated should further clarify how the CL changes with increased thermal alteration. Author

N92-12914*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.
COSMOGENIC Ar-36 FROM NEUTRON CAPTURE BY Cl-35 IN THE CHICO L6 CHONDRITE: ADDITIONAL EVIDENCE FOR LARGE SHIELDING Abstract Only
D. H. Garrison, D. D. Bogard, and G. F. Herzog (Rutgers - The State Univ., New Brunswick, NJ.) *In* Lunar and Planetary Inst., Abstracts for the 54th Annual Meeting of the Meteoritical Society 1991 p 6 (For primary document see N92-12901 03-90)
Avail: NTIS HC/MF A14 CSCL 03B

The cosmic ray produced Ar-36/Ar-38 ratio measured in iron meteorites is about 0.65, but is not well determined for stone meteorites due to the common presence of trapped Ar or absorbed atmospheric Ar in bulk analysis. Almost all single-extraction measurements of stones give Ar-36/Ar-38 ratios intermediate between the trapped and air values of 5.3 and the expected cosmogenic value of about 0.65. The isotopic composition of Ar was measured for stepwise temperature release of both chondritic and melt portions of Chico. The Chico data suggest that for large chondrites, the cosmogenic Ar-36/Ar-38 ratio may well be higher than 0.65, and therefore the procedure of correcting bulk analysis results may underestimate the concentration of cosmogenic Ar-38. In this context we note that in analysis of many Antarctic chondrites observed that determined amounts of cosmogenic Ar-38 averaged about 13 percent too low in comparison to that expected from measurements of other cosmogenic species. Author

N92-12915*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.
Cs-135 - Ba-135: A NEW COSMOCHRONOMETRIC CONSTRAINT ON THE ORIGIN OF THE EARTH AND THE ASTROPHYSICAL SITE OF THE ORIGIN OF THE SOLAR SYSTEM Abstract Only
C. L. Harper, H. Wiesmann, and L. E. Nyquist *In* Lunar and Planetary Inst., Abstracts for the 54th Annual Meeting of the Meteoritical Society 1991 p 8 (For primary document see N92-12901 03-90)
Avail: NTIS HC/MF A14 CSCL 03B

It is argued that if Cs-135 was indeed present in the early solar system at the level inferred from evidence presented here, then two major conclusions follow. (1) A supernova contributed newly synthesized r-process matter into the protosolar reservoir within approx. 5 Ma of the Cs/Ba fractionation recorded in LEW 86010; (2) The strong Cs depletion in the bulk Earth reservoir (Cs-133/Ba-135 approx. 0.1) took place very early in solar system history. If this volatile loss was pre-accretionary, then the accretionary chronology of the Earth is not constrained. However, if it is a consequence of accretion, then the very tight time constraint of approx. less than 5 Ma (rel. to LEW 86010) is obtained for accretion of most of the Earth's mass. Author

N92-12916*# Lockheed Engineering and Sciences Co., Houston, TX.
A LIQUIDUS PHASE DIAGRAM FOR A PRIMITIVE SHERGOTTITE Abstract Only
A. J. G. Jurewicz, L. Le, and J. H. Jones *In* Lunar and Planetary Inst., Abstracts for the 54th Annual Meeting of the Meteoritical Society 1991 p 109 (For primary document see N92-12901 03-90)
Avail: NTIS HC/MF A14 CSCL 03B

To see if there is any relationship between primitive shergottites such as Eg and evolved shergottites such as Shergotty and Zagami, we performed one-bar experiments on the Eg composition. Broadly, our experimental results compare favorably with prediction. Our inferred phase diagram and comparison to Shergotty and Zagami

melting experiments of Stolper and McSween are given. It does not appear possible to derive bulk Shergotty or Zagami by either equilibrium or fractional crystallization of Eg. However, if Shergotty and Zagami are cumulates, it may be possible to derive the inferred interstitial liquid from a composition such as Eg. Author

N92-12917*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.
EXTRATERRESTRIAL WATER OF POSSIBLE MARTIAN ORIGIN IN SNC METEORITES: CONSTRAINTS FROM OXYGEN ISOTOPES Abstract Only
H. R. Karlsson, R. N. Clayton, E. K. Gibson, T. K. Mayeda, and R. A. Socki (Lockheed Engineering and Sciences Co., Houston, TX.) *In* Lunar and Planetary Inst., Abstracts for the 54th Annual Meeting of the Meteoritical Society 1991 p 113 (For primary document see N92-12901 03-90)
Avail: NTIS HC/MF A14 CSCL 03B

Many lines of evidence suggest that the SNC group of meteorites (Shergotty-Nakhla-Chassigny) are derived from the planet Mars. Because SNC meteorites have water, they may contain information on the origin and fate of water on the planet Mars. The first measurements are presented of delta O-18 and delta O-17 of water extracted from SNC's. The water analyses are displayed with each meteorite designated. The isotopic composition is shown of the SNC waters relative to the SNC whole rocks and the terrestrial line. The O-17 excess is shown of the SNC water as a function of pyrolysis temperature. And delta O-18 values are displayed of the water as a function of pyrolysis temperature for the four SNC meteorites. The analyses are briefly examined.
Author

N92-12918*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.
THE ORIGIN OF AMORPHOUS RIMS ON LUNAR PLAGIOCLASE GRAINS: SOLAR WIND DAMAGE OR VAPOR CONDENSATES Abstract Only
Lindsay P. Keller and David S. McKay *In* Lunar and Planetary Inst., Abstracts for the 54th Annual Meeting of the Meteoritical Society 1991 p 114 (For primary document see N92-12901 03-90)
Avail: NTIS HC/MF A14 CSCL 03B

A distinctive feature of micron sized plagioclase grains from mature lunar soils is a thin (20 to 100 nm) amorphous rim surrounding the grains. These rims were originally described from high voltage electron microscope observations of lunar plagioclase grains by Dran et al., who observed rims up to 100 nm thick on plagioclase grains from Apollo 11 and 12 soils. These rims are believed to be the product of solar wind damage. The amorphous rims were studied on micron sized plagioclase grains from a mature Apollo 16 soil using a JEOL 200FX transmission electron microscope equipped with an energy dispersive x ray spectrometer. It was found that the amorphous rims are compositionally distinct from the interior plagioclase and it is proposed that a major component of vapor condensates is present in the rims. Author

N92-12919*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.
TRANSMISSION ELECTRON MICROSCOPY OF AN INTERPLANETARY DUST PARTICLE WITH LINKS TO CI CHONDRITES Abstract Only
Lindsay P. Keller, Kathie L. Thomas (Lockheed Engineering and Sciences Co., Houston, TX.), and David S. McKay *In* Lunar and Planetary Inst., Abstracts for the 54th Annual Meeting of the Meteoritical Society 1991 p 115 (For primary document see N92-12901 03-90)
Avail: NTIS HC/MF A14 CSCL 03B

The majority of hydrated interplanetary dust particles (IDPs) have compositions that resemble CI and CM chondrites, however, their mineralogies are most similar to the fine grained material in certain altered type-3 carbonaceous and ordinary chondrites. During the transmission electron microscope studies of hydrated IDPs, a unique particle was discovered whose mineralogy is very similar to that reported from CI chondrites. W7013F5 is the first IDP whose mineralogy and chemistry approximates that of CI chondrites. The similarity in mineralogy and mineral chemistry suggests that W7013F5 was altered under conditions similar to those that existed on the CI parent bodies. Author

N92-12920*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, CA.
EVALUATION OF THE STRECKER SYNTHESIS AS A SOURCE OF AMINO ACIDS ON CARBONACEOUS CHONDRITES Abstract Only
N. R. Lerner, Etta Peterson, and S. Chang *In* Lunar and Planetary Inst., Abstracts for the 54th Annual Meeting of the Meteoritical Society 1991 p 132 (For primary document see N92-12901 03-90)
Avail: NTIS HC/MF A14 CSCL 03B

The Strecker synthesis (SS) has been proposed as the source of amino acids (AA) formed during aqueous alteration of carbonaceous chondrites. It is postulated that the aldehyde and ketone precursors of the meteoritic AA originated in interstellar syntheses and accreted on the meteorite parent body along with other reactant species in cometesimal ices. The SS has been run with formaldehyde, acetyldehyde, propionaldehyde, acetone, and methyl ketone as starting materials. To study the effect of minerals on the reaction, the SS was run in the presence and absence of dust from the Allende meteorite using deuterated aldehydes and ketones as starting materials. The products were studied by GC/MS. With the exception of glycine, the retention of deuterium in the AA was greater than 90 pct. Some D exchange with water does occur, however, and determination of the rate of exchange as a function of pH and temperature may allow some bounds to be placed on the duration of parent body aqueous alteration. The retention of D by the AA under conditions studied thus far is consistent with the model that a SS starting from interstellar aldehydes and ketones led to the production of meteoritic AA.
Author

N92-12921*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.
MICROPROBE STUDIES OF MICROTOMED PARTICLES OF WHITE DRUSE SALTS IN SHERGOTTITE EETA 79001 Abstract Only
D. J. Lindstrom *In* Lunar and Planetary Inst., Abstracts for the 54th Annual Meeting of the Meteoritical Society 1991 p 137 (For primary document see N92-12901 03-90)
Avail: NTIS HC/MF A14 CSCL 03B

The white druse material in Antarctic shergottite EETA 79001 has attracted much attention as a possible sample fo Martian aqueous deposits. Instrumental Neutron Activation Analysis (INAA) was used to determine trace element analyses of small particles of this material obtained by handpicking of likely grains from broken surfaces of the meteorite. Electron microprobe work was attempted on grain areas as large as 150x120 microns. Backscattered electron images show considerable variations in brightness, and botryoidal structures were observed. Microprobe analyses showed considerable variability both within single particles and between different particles. Microtomed surfaces of small selected particles were shown to be very useful in obtaining information on the texture and composition of rare lithologies like the white druse of EETA 79001. This material is clearly heterogeneous on all distance scales, so a large number of further analyses will be required to characterize it.
Author

N92-12922*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.
RELATIONSHIPS AMONG BASALTIC LUNAR METEORITES Abstract Only
Marilyn M. Lindstrom *In* Lunar and Planetary Inst., Abstracts for the 54th Annual Meeting of the Meteoritical Society 1991 p 138 (For primary document see N92-12901 03-90)
Avail: NTIS HC/MF A14 CSCL 03B

During the past two years four meteorites of dominantly mare basalt composition were identified in the Japanese and US Antarctic collections. Basalts represent a much higher proportion of the

lunar meteorites than is expected from photogeologic mapping of mare and highland regions. Also, the basaltic lunar meteorites are all described as VLT mare basalt, which is a relatively uncommon type among returned lunar samples. The significance of the basaltic meteorites to the understanding of the lunar crust depends on the evaluation of possible relationships among the individual meteorites. None of the specimens are paired meteorites. They differ from each other in petrography and composition. It is important to determine whether they might be paired ejecta which were ejected from the same mare region by the same impact. The question of paired ejecta must be addressed using a combination of exposure histories and petrographic/compositional characteristics. It is possible that the basaltic lunar meteorites are paired ejecta from the same region of the Moon. However, the relationships among them are more complicated than the basaltic breccias being simply brecciated mare gabbros. Author

N92-12923*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.

DYNAMIC CRYSTALLIZATION CHARACTERISTICS OF ENSTATITE CHONDRITE CHONDRULES Abstract Only

Gary E. Lofgren, John M. DeHart, and A. B. Lanier (Lockheed Engineering and Sciences Co., Houston, TX.) *In* Lunar and Planetary Inst., Abstracts for the 54th Annual Meeting of the Meteoritical Society 1991 p 142 (For primary document see N92-12901 03-90)

Avail: NTIS HC/MF A14 CSCL 03B

Although the chemical properties of enstatite and ordinary chondrites are distinctly different, they both contain chondrules with a similar array of textures. This similarity suggests like origins. Textural studies using chondrule compositions from ordinary chondrites suggest that these chondrules have an igneous origin: either by crystallization from melts or from partial melts of crystalline material. In contrast, the cathodoluminescence (CL) properties of the enstatite from enstatite chondrites were interpreted to mean that mechanical aggregation played an important part in their formation. An alternative interpretation of these CL properties, however, suggests that variations in the minor element content of the enstatite, a probable result of igneous fractionation processes, could also produce different CL colors. An attempt was made to evaluate the two models by performing dynamic crystallization experiments on an average enstatite chondrule composition and by looking at the resultant CL. The textures grown on experimentally crystallized E-chondrite melts confirm that formational processes are similar to those for the ordinary chondrites with the obvious exception of the oxidation state. Author

N92-12924*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.

OLIVINES IN ANGRITE LEW 87051: PHENOS OR XENOS Abstract Only

G. McKay, L. Le, and J. Wagstaff (Lockheed Engineering and Sciences Co., Houston, TX.) *In* Lunar and Planetary Inst., Abstracts for the 54th Annual Meeting of the Meteoritical Society 1991 p 151 (For primary document see N92-12901 03-90)

Avail: NTIS HC/MF A14 CSCL 03B

Nyquist et al. recently reported the presence of live Mn-53 in angrite LEW 86010 when it crystallized. Hence, melting must have occurred within approx. 10 Ma of the accretion of the angrite parent body, and LEW 86010 is the oldest known differentiated meteorite. This discovery has made it even more desirable to understand teh petrogenesis of angrites, which presumably were all formed at a similar time. As part of the continuing work on angrite petrogenesis, crystallization experiments were conducted on LEW 87051, the other Antarctic angrite, to clarify its petrogenesis. Several aspects of the experimental work is reported. Although the details are not understood, it is clear that the Cr abundance in the experimental olivines must be controlled by spinel crystallization. Author

N92-12925*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.

Nd-142/Nd-144 IN SNCs AND EARLY DIFFERENTIATION OF A HETEROGENEOUS MARTIAN MANTLE Abstract Only c91

L. E. Nyquist, C. L. Harper, H. Wiesmann, B. Bansal, and C.-Y. Shih (Lockheed Engineering and Sciences Co., Houston, TX.) *In* Lunar and Planetary Inst., Abstracts for the 54th Annual Meeting of the Meteoritical Society 1991 p 178 Prepared in cooperation with NAS-NRC, Washington, DC (For primary document see N92-12901 03-90)

Avail: NTIS HC/MF A14 CSCL 03B

Sm/Nd correlated variations in Nd-142/Nd-144 have been observed for mineral phases of achondrites from decay of live Sm-146 in the early solar system. Crystallization ages of shergottites-nakhlites-Chassigny (SNC) meteorites are less than or = 1.3 Ga, so variations of Nd-142/Nd-144 among mineral phases of the SNC's are not expected. However, if SNC's were derived from source reservoirs of differing Sm/Nd ratios, established while Sm-146 was still alive, and which remained isolated except for magma extraction, then variations in Nd-142/Nd-144 would exist among individual SNC meteorites. Rb-Sr and U-Pb isotopic data for the shergottites imply differentiation of their parent planet approximately 4.6 Ga ago. The confirmation of the conclusion that the nakhlites and shergottites were derived from different source regions, and that, consequently, the shergottite parent body (SPB) mantle was heterogeneous is presented. Author

N92-12926*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, CA.

MODIFICATION OF AMINO ACIDS AT SHOCK PRESSURES OF 3 TO 30 GPA: INITIAL RESULTS Abstracts Only

Etta Peterson, Friedrich Horz, Gerald Haynes, and Thomas See (Lockheed Engineering and Sciences Co., Houston, TX.) *In* Lunar and Planetary Inst., Abstracts for the 54th Annual Meeting of the Meteoritical Society 1991 p 188 (For primary document see N92-12901 03-90)

Avail: NTIS HC/MF A14 CSCL 03B

Since the discovery of amino acids in the Murchison meteorite, much speculation has focused on their origin and subsequent alteration, including the possible role of secondary processes, both terrestrial and extraterrestrial. As collisional processes and associated shock waves seem to have affected the silicate portions of many primitive meteorites, a mixture of powdered Allende (125-150 m grain size) and nine synthetic amino acids (six protein and three nonprotein) were subjected to controlled shock pressures from 3 to 30 GPa to determine the effect of shocks on amino acid survivability. Preliminary characterizations of the recovered shock products are presented. Author

N92-12927*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, CA.

IMAGING ANALYSIS OF LDEF CRATERS Abstract Only c18

F. RadicatidiBrozolo, D. W. Harris, J. A. Chakel, R. H. Fleming (Evans, Charles and Associates, Redwood City, CA), and T. E. Bunch *In* Lunar and Planetary Inst., Abstracts for the 54th Annual Meeting of the Meteoritical Society 1991 p 194 (For primary document see N92-12901 03-90)

Avail: NTIS HC/MF A14 CSCL 03B

Two small craters in Al from the Long Duration Exposure Facility (LDEF) experiment tray A11E00F (no. 74, 119 micron diameter and no. 31, 158 micron diameter) were analyzed using Auger electron spectroscopy (AES), time-of-flight secondary ion mass spectroscopy (TOF-SIMS), low voltage scanning electron microscopy (LVSEM), and SEM energy dispersive spectroscopy (EDS). High resolution images and sensitive elemental and molecular analysis were obtained with this combined approach. The result of these analyses are presented. Author

N92-12928*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.
CARBON AND OXYGEN ISOTOPE COMPOSITION OF CARBONATES FROM AN L6 CHONDRITE: EVIDENCE FOR TERRESTRIAL WEATHERING FROM THE HOLBROOK METEORITE Abstract Only
R. A. Socki, E. K. Gibson, A. J. T. Jull, and H. R. Karlsson (Lockheed Engineering and Sciences Co., Houston, TX.) *In* Lunar and Planetary Inst., Abstracts for the 54th Annual Meeting of the Meteoritical Society 1991 p 217 (For primary document see N92-12901 03-90)
Avail: NTIS HC/MF A14 CSCL 03B

Terrestrial weathering in meteorites is an important process which alters pristine elemental and isotopic abundances. The Holbrook L6 chondrite fell in 1912. Material was recovered at the time of the fall, in 1931, and 1968. The weathering processes operating on the freshly fallen meteorite in a semi-arid region of northeastern Arizona have been studied after a ground residence of 19 and 56 years. It has been shown that a large portion of the carbonate material in 7 Antarctic ordinary chondrites either underwent extensive isotopic exchange with atmospheric CO2, or formed recently in the Antarctic environment. In fact it has been demonstrated that hydrated Mg-carbonates, nesquehonite and hydromagnesite, formed in less than 40 years on LEW 85320. In order to help further constrain the effects of terrestrial weathering in meteorites, the carbon and oxygen isotopes extracted from carbonates of three different samples of Holbrook L6: a fresh sample at the time of the fall in 1912, a specimen collected in 1931, and a third specimen collected at the same site in 1968.
Author

N92-12929*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.
IDDINGSITE IN THE NAKHLA METEORITE: TEM STUDY OF MINERALOGY AND TEXTURE OF PRE-TERRESTRIAL (MARTIAN?) ALTERATIONS Abstract Only
Allan H. Treiman and James L. Gooding *In* Lunar and Planetary Inst., Abstracts for the 54th Annual Meeting of the Meteoritical Society 1991 p 231 (For primary document see N92-12901 03-90)
Avail: NTIS HC/MF A14 CSCL 03B

Rusty-colored veinlets and patches in the Nakhla meteorite, identified as iddingsite, are pre-terrestrial. The rusty material is iddingsite (smectites + hematite + ferrihydrite); like terrestrial iddingsites, it probably formed during low-temperature interaction of olivine and water. Fragments of rusty material with host olivine were removed from thin sections of Nakhla with a tungsten needle. Fragments were embedded in epoxy, microtomed to 100 nanometers thickness, and mounted on Cu grids. Phase identifications were by Analytical Electron Microscopy/Energy Dispersive X-ray Analysis (EM/EDX) standardless chemical analyses (for silicates), electron diffraction (hematite and ferrihydrite), and lattice fringe imaging. This iddingsite in Nakhla is nearly identical to some formed on Earth, suggesting similar conditions of formation on the Shergottites-Nakhlites-Chassigny (SNC) meteorite parent planet. A more detailed account of the results is presented.
Author

N92-12930*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.
CARBONATE AND SULFATE MINERALS IN THE CHASSIGNY METEORITE Abstract Only
Susan J. Wentworth (Lockheed Engineering and Sciences Co., Houston, TX.) and James L. Gooding *In* Lunar and Planetary Inst., Abstracts for the 54th Annual Meeting of the Meteoritical Society 1991 p 247 (For primary document see N92-12901 03-90)
Avail: NTIS HC/MF A14 CSCL 03B

SO2 and CO2 from pyrolysis and combustion of bulk Chassigny and infrared traces of sulfate and carbonate minerals have been previously reported. Using scanning electron microscopy (SEM) and energy-dispersive x ray spectrometry (EDS), portions of these samples are searched, and a Ca-sulfate/carbonate association is confirmed.
Author

N92-12931*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, CA.
FRACTIONATION OF TERRESTRIAL NEON BY HYDRODYNAMIC HYDROGEN ESCAPE FROM ANCIENT STEAM ATMOSPHERES Abstract Only **c46**
K. Zahnle *In* Lunar and Planetary Inst., Abstracts for the 54th Annual Meeting of the Meteoritical Society 1991 p 259 (For primary document see N92-12901 03-90)
Avail: NTIS HC/MF A14 CSCL 03B

Atmospheric neon is isotopically heavier than mantle neon. By contrast, nonradiogenic mantle Ar, Kr, and Xe are not known to differ from the atmosphere. These observations are most easily explained by selective neon loss to space; however, neon is much too massive to escape from the modern atmosphere. Steam atmospheres are a likely, if intermittent, feature of the accreting Earth. They occur because, on average, the energy liberated during accretion places Earth above the runaway greenhouse threshold, so that liquid water is not stable at the surface. It is found that steam atmospheres should have lasted some ten to fifty million years. Hydrogen escape would have been vigorous, but abundant heavy constituents would have been retained. There is no lack of plausible candidates; CO2, N2, or CO could all suffice. Neon can escape because it is less massive than any of the likely pollutants. Neon fractionation would have been a natural byproduct. Assuming that the initial Ne-20/Ne-22 ratio was solar, it was found that it would have taken some ten million years to effect the observed neon fractionation in a 30 bar steam atmosphere fouled with 10 bars of CO. Thicker atmospheres would have taken longer; less CO, shorter. This mechanism for fractionating neon has about the right level of efficiency. Because the lighter isotope escapes much more readily, total neon loss is pretty minimal; less than half of the initial neon endowment escapes.
Author

N92-12932*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.
MINERALOGY AND MATRIX COMPOSITION OF CR CHONDRITES RENAZZO AND EET 87770, AND UNGROUPED CHONDRITES ESSEBI AND MAC 87300 Abstract Only
Michael E. Zolensky *In* Lunar and Planetary Inst., Abstracts for the 54th Annual Meeting of the Meteoritical Society 1991 p 263 (For primary document see N92-12901 03-90)
Avail: NTIS HC/MF A14 CSCL 03B

The fine-grained mineralogy of the matrix of two CR chondrites, Renazzo and EET 87770, and the ungrouped (but possible related) Essebi and MAC 87300 chondrites was characterized using standard microprobe (focussed beam) and transmission electron microscopy (TEM) techniques (using ultramicrotomed sections). These results are compared to previously obtained results for 31 other carbonaceous chondrites.
Author

N92-12933*# National Academy of Sciences - National Research Council, Washington, DC.
HIGH-ENERGY ASTROPHYSICS. AMERICAN AND SOVIET PERSPECTIVES
Walter H. G. Lewin, ed., George W. Clark, ed., Rashid A. Sunyaev, ed., Kathleen Kearney Trivers, ed., and David M. Abramson, ed. National Academy Press 1991 424 p Workshop held in Moscow, USSR, 18 Jun. - 1 Jul. 1989 Prepared in cooperation with Academy of Sciences (USSR), Moscow
(Contract NASw-4383)
(NASA-CR-186558; NAS 1.26:186558; LC-90-62813;
ISBN-0-309-04334-4) Avail: NTIS HC/MF A18 CSCL 03B

The proceedings of the American-Soviet high energy astrophysics workshop, which was held at the Institute for Space Research in Moscow and the Abastumani Laboratory and Observatory in the republic of Georgia from June 18 to July 1, 1989, is presented. Topics discussed at the workshop include the inflationary universe; the large scale structure of the universe, the diffuse x-ray background; gravitational lenses, quasars, and active galactic nuclei (AGNs); infrared galaxies (results from IRAS);

Supernova 1987A; millisecond radio pulsars; quasi-periodic oscillations in the x-ray flux of low mass X-ray binaries; and gamma ray bursts. For individual titles, see N92-12934 through N92-12973.

N92-12934*# Arizona Univ., Tucson.
INSTABILITIES IN SN1987A AND OTHER SUPERNOVAE
David Arnett, Bruce Fryxell, and Ewald Mueller (Max-Planck-Inst. fuer Astrophysik, Garching, Germany, F.R.) *In* NAS-NRC, High-Energy Astrophysics. American and Societ Perspectives 1991 p 1-8 (For primary document see N92-12933 03-90)
Avail: NTIS HC/MF A18 CSCL 03B

While giving a remarkably good description of many aspects of SN1987A, calculations assuming spherical symmetry have a number of flaws. Many of these problems naturally disappear in the development of a 2-D calculation, as nonspherical instabilities grow. This nonspherical behavior, made evident in SN1987A, has implications for other types of supernovae. Author

N92-12935*# Academy of Sciences (USSR), Moscow. Lebedev Physical Inst.
ON THE EVOLUTION OF PULSARS
V. S. Beskin, A. V. Gurevich, and Ya. N. Istomin *In* NAS-NRC, High-Energy Astrophysics. American and Soviet Perspectives 1991 p 9-13 (For primary document see N92-12933 03-90)
Avail: NTIS HC/MF A18 CSCL 03B

Data from a previous investigation on the angle chi between the axis of rotation and the magnetic dipole axis, determined from polarization observations, provides a complete catalog which makes it possible to carry out a detailed comparison of the theoretical results of this present investigation with the observed distribution of radio pulsars over the angel chi. Before such a comparison is made, the main features of a theory for pulsar evolution is described. Author

N92-12936*# Academy of Sciences (USSR), Moscow. Lebedev Physical Inst.
THE SPIN DOWN OF THE RADIO PULSARS: BRAKING INDEX
V. S. Beskin, A. V. Gurevich, and Ya. N. Istomin *In* NAS-NRC, High-Energy Astrophysics. American and Soviet Perspectives 1991 p 14-18 (For primary document see N92-12933 03-90)
Avail: NTIS HC/MF A18 CSCL 03B

Presently, the value of the retardation dP/dt is well known for most radio pulsars. It is negative for all cases except one and is of the order of 10(exp -15). That single case is when the pulsar, which is located in the star globular system, can have a considerable acceleration leading to the opposite sign of P'= dP/dt due to the Doppler effect. Careful measurements of the period, P, also allow one to determine the variation of this retardation with the course of time- P'' = d(exp 2)P/dt(exp 2). The results of these measurements are usually represented in the form of the dimensionless retardation index n = omega'' omega/omega(exp 2)= 2 - P''P/P(exp 2) (omega is the angular velocity). The data for 21 pulsars are given. The parameter, n, is strongly undetermined both in value and sign in all cases except for four pulsars. Changes of the rotation period, P, and the inclination angle, chi, the angle between the axes of rotation and the magnetic moment are caused by two processes: the regular retardation and nutation due to deviation from the strict spherical shape of the neutron star. Losses which are caused by the currents flowing in the magnetosphere of the neutron star and by being closed on the star surface are considered. Such losses are critical for the neutron star magnetosphere which is full of dense plasma. Since the radio emission is generated in the dense plasma of the polar magnetosphere, then practically all radio pulsars are retarded by the current mechanism. The formula for the braking index is presented along with other aspects of the investigation. Author

N92-12937*# Institute of Space Research, Moscow (USSR).
AXIALLY SYMMETRICAL SUPERNOVA REMNANTS
G. S. Bisnovatyi-Kogan, T. A. Lozinskaya, and S. A. Silich (Academy of Sciences of the Ukrainian SSR, Kiev.) *In* NAS-NRC, High-Energy Astrophysics. American and Soviet Perspectives 1991 p 19-27 (For primary document see N92-12933 03-90)
Avail: NTIS HC/MF A18 CSCL 03B

The origin of cylindrically symmetric supernova remnants (SNR's) is discussed. The results of numerical simulations of two most distinguished barrel-like SNR's SN1006 and G296.5+10.0 are presented. Author

N92-12938*# Harvard-Smithsonian Center for Astrophysics, Cambridge, MA.
NEUTRON STARQUAKE MODEL FOR GAMMA-RAY BURSTS
R. D. Blandford *In* NAS-NRC, High-Energy Astrophysics. American and Soviet Perspectives 1991 p 28-38 Prepared in cooperation with California Inst. of Tech., Pasadena Sponsored in part by Guggenheim Foundation, and the Smithsonian Inst. (For primary document see N92-12933 03-90)
(Grant NSF AST-86-15325)
Avail: NTIS HC/MF A18 CSCL 03B

A neutron starquake model for gamma ray bursts is presented and critically analyzed. It is suggested that a slowly accreting neutron star may develop density inversions deep in its crust. These unstable layers, may be subject to elastic Rayleigh-Taylor instability which can liberate sufficient gravitational and perhaps also nuclear energy to account for individual bursts. Energy can be transported to the surface by shear waves and slowly transmitted into the magnetosphere as relativistic Alfven waves. Particle acceleration and gamma ray emission from the outer magnetosphere should ensue. Some observational implications are mentioned. Author

N92-12939*# Institute for Theoretical and Experimental Physics, Moscow (USSR).
THE SHOCK BREAKOUT IN SN1987A MODELLED WITH THE TIME-DEPENDENT RADIATIVE TRANSFER
S. I. Blinnikov and D. K. Nadyoshin (Sternberg Astronomical Inst., Moscow, USSR) *In* NAS-NRC, High-Energy Astrophysics. American and Soviet Perspectives 1991 p 39-45 (For primary document see N92-12933 03-90)
Avail: NTIS HC/MF A18 CSCL 03B

A fully implicit high-order scheme was developed for the independent multi-group radiative transfer coupled with implicit hydrodynamics. The application of this scheme to the SN1987A explosion shows that shortly after the shock breakout a dense shell forms. A gasdynamic code describing the time dependent radiation transport in the multi-group approximation with variable Eddington factors was developed. Results and other aspects of the project are presented. Author

N92-12940*# Abastumani Astrophysical Observatory, Georgia (USSR).
MANIFESTATIONS OF DYNAMO DRIVEN LARGE-SCALE MAGNETIC FIELD IN ACCRETION DISKS OF COMPACT OBJECTS
G. D. Chagelishvili, R. G. Chanishvili, J. G. Lominadze, and Z. A. Sokhadze *In* NAS-NRC, High-Energy Astrophysics. American and Soviet Perspectives 1991 p 46-54 Previously announced in IAA as A91-46681 (For primary document see N92-12933 03-90)
Avail: NTIS HC/MF A18 CSCL 03B

A turbulent dynamo nonlinear theory of turbulence was developed that shows that in the compact objects of accretion disks, the generated large-scale magnetic field (when the generation takes place) has a practically toroidal configuration. Its energy density can be much higher than turbulent pulsations energy density, and it becomes comparable with the thermal energy density of the medium. On this basis, the manifestations to which the large-scale magnetic field can lead at the accretion onto black holes and gravimagnetic rotators, respectively, are presented. Author

N92-12941*# Abastumani Astrophysical Observatory, Georgia (USSR).
TURBULIZATION OF SHEAR FLOWS IN ASTROPHYSICS

G. D. Chagelishvili, R. G. Chanishvili, and J. G. Lominadze *In* NAS-NRC, High-Energy Astrophysics. American and Soviet Perspectives 1991 p 55-64 (For primary document see N92-12933 03-90)
Avail: NTIS HC/MF A18 CSCL 03B

The problem of instability in shear flows is treated in a number of works which present a global analysis of irrotational (potential) modes in a 2-D compressible shear flow, implying that, in the presence of reflecting boundaries, those modes can increase and that the characteristic time of the increase is several orders as high as the dynamic time in the medium. Due to the slowness of the increase of irrotational modes and to the problematic character of the theory's applicability for thin accretion disks, an attempt was made to develop an alternative theory of turbulization shear flows. It is quite contrary to the above theory. Instead of the global analysis, a local one is made far from the flow boundaries. Instead of irrotational perturbations, vortical ones are examined. Lastly, the medium is considered to be incompressible. The flow in the accretion disk can be modeled by a plane Couette flow, without regard for boundary conditions: it can be modeled by a plane shear flow in infinite incompressible fluid. According to this scenario, there is a critical perturbation level in the free shear flow. If the level of initial perturbations exceeds the critical one, the flow is turbulized. Author

N92-12942*# Academy of Sciences (USSR), Moscow. Shternberg Astronomical Inst.
REGULAR VARIABILITY OF THE SHAPE OF THE PRIMARY MINIMUM OF THE ORBITAL LIGHT CURVE OF SS 433 WITH THE PHASE OF THE PRECESSIONAL PERIOD
A. M. Cherepashchuk and S. F. Yarlikov *In* NAS-NRC, High-Energy Astrophysics. American and Soviet Perspectives 1991 p 65-67 (For primary document see N92-12933 03-90)
Avail: NTIS HC/MF A18 CSCL 03B

The regular variations of the shape of the primary minimum of the orbital 13.082-day light curve of SS 433 with the phase of the 162.5-day processional period were discovered by analysis of the photometrical databank. The regular variability of the shape of the primary minimum of the discovered light curve of SS 433 reflects displacement with the 26-day double orbital period of at least two hot bright spots on the surface of the processional accretional disk and their eclipse by a normal star. Other aspects of the investigation are further discussed. Author

N92-12943*# Academy of Sciences (USSR), Moscow. Lebedev Physical Inst.
CHAOTIC INFLATIONARY UNIVERSE AND THE ANISOTROPY OF THE LARGE-SCALE STRUCTURE
G. V. Chibisov and Yu. V. Shtanov *In* NAS-NRC, High-Energy Astrophysics. American and Soviet Perspectives 1991 p 68-76 (For primary document see N92-12933 03-90)
Avail: NTIS HC/MF A18 CSCL 03B

It has been realized that the inflationary universe is in fact chaotic, that globally it is strongly inhomogeneous, and that the inflation in the universe as a whole is eternal. In such a picture the region available to modern observations is just a tiny part of the universe, in which inflation finished about 10(exp 10) years ago. In spite of the great popularity of the chaotic inflationary universe models, it is usually taken for granted that their specific features (such as strong global inhomogeneity of the universe) can hardly lead to any observable consequences. The argument is that all that is seen is just a tiny part of the universe, a region about 10(exp 28) cm, and the typical scales of considerable inhomogeneities are much greater than this size. In contrast to this opinion, an attempt is made to show that such observable consequences can really exist. The phenomenon closely connected with the origin of structure (galaxies, clusters, etc.) in the observable region is discussed. The main idea considered is the vacuum fluctuations evolution on the inhomogeneous background.
Author

N92-12944*# Massachusetts Inst. of Tech., Cambridge.
THE CYCLOTRON ABSORPTION LINE AND ECLIPSE TRANSITION PHENOMENA OF 4U 1538-52
George W. Clark *In* NAS-NRC, High-Energy Astrophysics. American and Soviet Perspectives 1991 p 77-86 (For primary document see N92-12933 03-90)
Avail: NTIS HC/MF A18 CSCL 03B

Observations of the eclipsing binary X ray pulsar, 4U 1538-52 have revealed a cyclotron absorption feature at 20 keV in the x ray spectrum. The pulse phase dependence of the intensity and spectrum can be mimicked by a model of x ray emission from thin accretion heated slabs at the magnetic poles of a rotating neutron star with its magnetic dipole axis inclined at 45 deg from the rotation axis. The observations also yielded data on the eclipse transitions which show that the radial density function at the base of the supersonic wind of the O-type supergiant primary has the form of an exponential like that which characterizes the density run in the similar region of the O-type supergiant primary of Cen X-3. As in the Cen X-3 system, the scale height of the exponential implies a temperature in the base region much greater than that of the supersonic wind. Author

N92-12945*# Academy of Sciences (USSR), Moscow. Lebedev Physical Inst.
RADIO TELESCOPES AS THE DETECTORS OF SUPER-HIGH-ENERGY NEUTRINOS **c89**
R. D. Dagkesamansky and I. M. Zheleznykh *In* NAS-NRC, High-Energy Astrophysics. American and Soviet Perspectives 1991 p 87-90 (For primary document see N92-12933 03-90)
Avail: NTIS HC/MF A18 CSCL 03A

The registration of super high energy neutrinos is a very difficult and also very important problem that requires construction of detectors with large effective target masses. Askaryan pointed out the possibility of registering cascades in dense media by the Cherenkov radio emission of an excess of negative charges in the cascades which arose in interaction between high energy particles and the atoms of medium. The telescopes for cosmic high energy neutrino detection by radioemission of cascades induced underground, but whose development continues in the atmosphere were proposed by others. The effective target masses of such detectors could be approx. 10(exp 9) tons and more. The properties of Cherenkov radio emission of cascades and the properties of ice in the Antarctic Region make it possible to propose Radio Antarctic Muon and Neutrino Detection (RAMAND): antennas should be placed on the ice surface of approx. 10 sq km to search for radio signals for neutrino (muon) cascades of energy. It is evident from data given that the largest radio telescopes gives the opportunity for registration of the cascades induced by neutrinos with the energies E is greater than or = 10(exp 20) eV.
Author

N92-12946*# California Univ., Berkeley.
OPTICAL OBSERVATIONS OF ACTIVE GALACTIC NUCLEI **c89**
Alexei V. Filippenko *In* NAS-NRC, High-Energy Astrophysics. American and Soviet Perspectives 1991 p 91-107 (For primary document see N92-12933 03-90)
Avail: NTIS HC/MF A18 CSCL 03A

The most important observed characteristics are described of active galactic nuclei, concentrating on their optical spectra. Connections with the standard model of such objects are emphasized. Some of the new observational developments that are leading to modifications of the standard model are outlined; these include spatial variations of the ionization parameters in the broad line region, the possible existence of a very dense component in the broad line region, and the presence of an intermediate density zone between the broad line and narrow line regions. Evidence for hidden Seyfert 1 nuclei and anisotropic ionizing radiation is also reviewed. The search for, and properties of, intrinsically weak Seyfert 1 nuclei are summarized, with emphasis given to the very low luminosity object in the late type dwarf galaxy NGC 4395. A discussion is also presented of the possibility

that low level activity in some galactic nuclei might actually be produced by bursts of star formation and their associated supernovae. Author

N92-12947*# Abastumani Astrophysical Observatory, Georgia (USSR).
ON TWO-DIMENSIONAL RELATIVISTIC STELLAR WINDS
M. E. Gedalin, J. G. Lominadze, and E. G. Tsikarishvili *In* NAS-NRC, High-Energy Astrophysics. American and Soviet Perspectives 1991 p 108-111 (For primary document see N92-12933 03-90)
Avail: NTIS HC/MF A18 CSCL 03B

Stellar wind is of great interest, because many of the astrophysical systems possess wind like structures. For a long time only nonrelativistic winds have been studied. However, recently it was proposed by Kennel et al. that the relativistic pulsar wind with the plasma, consisting of electrons and positrons, can be responsible for the observed features of the Crab nebula. The study of Kennel et al. revealed the inconsistency of the assumption of the wind zero temperature with the observational data. It has been shown that only for high relativistic temperatures can high Mach numbers be reached, which allows the possibility of a shock formation. The analysis of Kennel et al. was extended into the 2-D case by using conventional magnetohydrodynamic equations for a relativistic plasma with an isotropic relativistic temperature. The state equation is assumed polytropic. Author

N92-12948*# Space Telescope Science Inst., Baltimore, MD.
CLUSTER RESEARCH WITH X RAY OBSERVATIONS c89
Riccardo Giacconi and Richard Burg *In* NAS-NRC, High-Energy Astrophysics. American and Soviet Perspectives 1991 p 112-133 (For primary document see N92-12933 03-90)
Avail: NTIS HC/MF A18 CSCL 03A

Past x ray surveys have shown that clusters of galaxies contain hot gas. Observations of this hot gas yield measurements of the fundamental properties of clusters. Results from a recent study of the x ray luminosity function of local Abell clusters are described. Future surveys are discussed and the potential for studying the evolution of clusters is analyzed. Author

N92-12949*# Academy of Sciences (USSR), Moscow. Space Research Inst.
OBSERVATIONS OF X RAY PULSARS FROM THE KVANT MODULE c93
M. Gilfanov, Rashid A. Sunyaev, E. Churazov, V. Loznikov, V. V. Efremov, A. Kaniovskiy, A. V. Kuznetsov, N. Yamburenko, A. Melioranskiy, and G. K. Skinner et al *In* NAS-NRC, High-Energy Astrophysics. American and Soviet Perspectives 1991 p 134-143 Prepared in cooperation with Space Research Organization Netherlands, Utrecht; Birmingham Univ. (England); Max Planck fuer Physik and Astrophysik; and Tuebingen Univ. (Fed. Republic of Germany) (For primary document see N92-12933 03-90)
Avail: NTIS HC/MF A18 CSCL 03B

The Roentgen international x ray observatory on the Kvant module of the Mir space station has been successfully operating since the beginning of June 1987. Many x ray sources were observed and among them were several x ray pulsars. Four telescopes mounted on board the Kvant module cover a wide energy range with good timing resolution. Timing analysis of the Kvant module data suffers from the presence of only short continuous intervals of source observations, separated by 90 min gaps (90 min is the orbital period of the Mir space station around the Earth). The presence of 90 min gaps leads to the appearance of beat frequencies v=v sub 0 + or - n/90 min (n = 1, 2, 3). Special analysis was applied to avoid this difficulty. Results are presented of the pulsation period measurements of the x ray pulsars Her X-1, Cen X-3, SMC X-1, Vela X-1, A0535 + 26 by the instruments on board the Kvant module in 1987 to 1989. The values of the periods are reduced to the solar system barycenter and to the binary system barycenter (excluding A0535 + 26). Author

N92-12950*# Academy of Sciences (USSR), Leningrad. Central Astronomical Observatory.
GENERATION OF ULTRAHIGH-ENERGY GAMMA RAYS IN ACCRETING X RAY PULSARS c93
Yu. N. Gnedin and N. R. Ikhsanov *In* NAS-NRC, High-Energy Astrophysics. American and Soviet Perspectives 1991 p 144-152 Original language document was announced in IAA as A91-22005 (For primary document see N92-12933 03-90)
Avail: NTIS HC/MF A18 CSCL 03B

Relativistic protons producing ultrahigh energy gamma rays as a result of nuclear collisions ought to be generated in close proximity to the surface of a neutron star due to accretion. The main features of the mechanism in question are a high efficiency of conversion of the gravitational energy of the accreting matter into acceleration energy and a high efficiency of the acceleration itself. It is shown that in accretion to a neutron star with a strong magnetic field, a loss cone type distribution of accreting protons is formed, which due to instability effectively generates small scale Alfven and proton cyclotron waves, as well as nonlinear waves (magneto-acoustic and Alfven solitons). The electric field of the moving solitons may accelerate the protons to energies of greater than 10(exp 15) eV. The region of acceleration is not locally isolated, but extends from its surface. New possible sources of ultrahigh energy gamma rays are predicted. They may be binary x ray systems containing neutron stars with magnetic fields of about 10(exp 9) gauss. Author

N92-12951*# Massachusetts Inst. of Tech., Cambridge.
CAN A MAN-MADE UNIVERSE BE ACHIEVED BY QUANTUM TUNNELING WITHOUT AN INITIAL SINGULARITY?
Alan H. Guth, K. Haller, ed., D. B. Caldi, ed., M. M. Islam, ed., R. L. Mallett, ed., P. D. Mannheim, ed., and M. S. Swanson, ed. *In* NAS-NRC, High-Energy Astrophysics. American and Soviet Perspectives 1991 p 153-173 Presented at the Meeting of the Division of Particles and Fields of the American Physical Society, Storrs, CT, 15-18 Aug. 1988 Prepared in cooperation with Harvard-Smithsonian Center for Astrophysics, Cambridge, MA (For primary document see N92-12933 03-90)
Avail: NTIS HC/MF A18 CSCL 03B

Essentially all modern particle theories suggest the possible existence of a false vacuum state; a metastable state with an energy density that cannot be lowered except by means of a very slow phase transition. Inflationary cosmology makes use of such a state to drive the expansion of the big bang, allowing the entire observed universe to evolve from a very small initial mass. A sphere of false vacuum in the present universe, if larger than a certain critical mass, could inflate to form a new universe which would rapidly detach from its parent. A false vacuum bubble of this size, however, cannot be produced classically unless an initial singularity is present from the outset. The possibility is explored that a bubble of subcritical size, which classically would evolve to a maximum size and collapse, might instead tunnel through a barrier to produce a new universe. The tunneling rate using semiclassical quantum gravity is estimated, and some interesting ambiguities in the formulas are discovered. Author

N92-12952*# Columbia Univ., New York, NY.
ON THE ORIGIN OF THE DIFFUSE X RAY BACKGROUND
David J. Helfand *In* NAS-NRC, High-Energy Astrophysics. American and Soviet Perspectives 1991 p 174-191 (For primary document see N92-12933 03-90)
(Grant NAG8-497)
Avail: NTIS HC/MF A18 CSCL 03B

The first measurement is reported of the intensity and spectrum of the diffuse x ray background in the 0.16 to 3.5 keV band which is free from contamination by sources with fluxes greater than approx. 6 x 10(exp -14) erg/sq cm/s. This result was made possible by the development of a number of techniques for reducing cosmic ray contamination and instrumental artifacts in the data collected by the Einstein Observatory imaging proportional counter. The analysis of the background data reveals a mean absolute intensity for the emission I sub x(0.16 to 3.5 keV) approx. = 5.6 x 10(exp -8) erg/sq cm/s/sr. The intensity is dependent on galactic

longitude even when only high galactic data are used, allowing the setting of a lower limit of 20 pct. on the galactic contribution to the mean emission band. The spectrum of the total background is consistent with a power law of slope similar to 0.7 between 0.16 and 3.5 keV with evidence for a steep rise toward lower energies. Preliminary evidence is also reported for the association of faint radio sources with peaks in the arcminute scale fluctuations of the diffuse x ray surface brightness distribution and then some implications are considered of these results. Author

N92-12953*# Massachusetts Inst. of Tech., Cambridge.
GRAVITATIONAL LENSES: THE CURRENT SAMPLE, RECENT RESULTS, AND CONTINUING SEARCHES
Jacqueline N. Hewitt *In* NAS-NRC, High-Energy Astrophysics. American and Soviet Perspectives 1991 p 192-203 (For primary document see N92-12933 03-90)
Avail: NTIS HC/MF A18 CSCL 03B

Gravitational lensing is one of the topics in astrophysics that was quite extensively discussed over time before it was actually discovered. Ten years after the discovery of the first one, it is interesting to note how the field has developed. After an initial slow rate of discovery, the last few years have seen an explosion in the number of reported cases. Attention was drawn to the first few cases because quasars at the same red shift, with similar optical spectra, were observed with angular separations of only a few arc seconds. Most observational effort has been devoted to searching for new candidate lens systems and carefully measuring their properties, both to test whether they are indeed lensed and to provide constraints for modeling. A classification of the lenses is into rings, arcs, multiples, and doubles, where the progression is from sources close to the optical axis to far from the optical axis. The known candidate systems are listed. The searches for gravitational lenses are proving to be successful, and more lenses continue to be discovered serendipitously. Many searches are under way, along with instruments that will routinely increase the resolution of astronomical imaging. Author

N92-12954*# California Univ., Berkeley.
COSMIC GAMMA-RAY BURSTS **c93**
K. Hurley *In* NAS-NRC, High-Energy Astrophysics. American and Soviet Perspectives 1991 p 204-217 Previously announced in IAA as A87-47616 Prepared in cooperation with Centre d'Etude Spatiale des Rayonnements, Toulouse (France) (For primary document see N92-12933 03-90)
Avail: NTIS HC/MF A18 CSCL 03B

A review of the cosmic gamma-ray burst phenomenon is presented. Both the light curves and the energy spectra of these short transient events display a great diversity. However, rapid rise times and periodicities sometimes observed in the light curves suggest a compact object origin. Similarly, absorption and emission features in the energy spectra argue strongly in favor of this interpretation. Counterparts to gamma-bursters in other energy ranges, such as optical and sort x-ray, have still not been identified, however, leading to a large uncertainty in the distances to bursters. Although gamma-ray burst sources have not yet been observed to repeat, numerous bursts from three objects which may be related to the gamma-bursters, called Soft Gamma Repeaters, have been recorded; there is weak evidence that they may be relatively distant on a galactic scale. Future missions, particularly those emphasizing high energy, time, and/or spatial resolution, as well as a multiwavelength approach, are likely to advance our understanding of this enigmatic phenomenon. Author

N92-12955*# Abastumani Astrophysical Observatory, Georgia (USSR).
GEORGIAN SPACE RESEARCH PROGRAM **c89**
G. P. Kakhidze *In* NAS-NRC, High-Energy Astrophysics. American and Soviet Perspectives 1991 p 218-224 (For primary document see N92-12933 03-90)
Avail: NTIS HC/MF A18 CSCL 03A

Considerations are presented of telescopes and spectrometers planned to be designed and made by the Abastumani Astrophysical Observatory of the Georgian SSR Academy of Science. The purpose of this topic is to clarify actual scientific problems which are to be solved by using telescopes. The experiments will begin in 1995. Author

N92-12956*# Abastumani Astrophysical Observatory, Georgia (USSR).
ON THE NATURE OF PULSAR RADIATION **c93**
A. Z. Kazbegi, G. Z. Machabeli, and G. I. Melikidze *In* NAS-NRC, High-Energy Astrophysics. American and Soviet Perspectives 1991 p 225-236 (For primary document see N92-12933 03-90)
Avail: NTIS HC/MF A18 CSCL 03B

A key question in the interpretation of the emission of pulsars is that of the excitation and propagation of waves in the magnetospheric plasma. The magnetosphere of a pulsar has an extremely complex structure and there are many difficulties in the development of its self-consistent model. At present there exist some sufficiently well-grounded models not exactly agreeing with each other. However, the creation of a dense, relativistic, electron-positron plasma in the polar regions of a rotating neutron star magnetospheres is the point of similarity among these models. The pulsar radiation should be generated in such a plasma. The following subject areas are discussed: the pulse radiation mechanism and applications to the central object in SN1987A remnant. Author

N92-12957*# Harvard-Smithsonian Center for Astrophysics, Cambridge, MA.
OBSERVING SN 1987A WITH THE INTERNATIONAL ULTRAVIOLET EXPLORER **c89**
Robert P. Kirshner *In* NAS-NRC, High-Energy Astrophysics. American and Soviet Perspectives 1991 p 237-250 (For primary document see N92-12933 03-90)
Avail: NTIS HC/MF A18 CSCL 03A

The International Ultraviolet Explorer (IUE) satellite played a leading role in elucidating the nature of SN 1987A, providing a unique ultraviolet perspective on the brightest supernova since 1604. IUE observations of SN 1987A began promptly after discovery and were frequent through 1988 and 1989, using the FES (Fine Error Sensor) for photometry, low dispersion spectra for the supernova spectrum, high dispersion observations for the interstellar medium when the supernova was bright, and for circumstellar gas surrounding the supernova as the initial event faded. The UV data were especially useful in determining which star exploded, assessing the ionizing pulse produced as the shock hit the surface of the star, and in constraining the stellar evolution that preceded the explosion through observation of a circumstellar shell. Author

N92-12958*# Massachusetts Inst. of Tech., Cambridge.
QUASI-PERIODIC OSCILLATIONS IN LOW-MASS X RAY BINARIES
Walter H. G. Lewin, J. vanParadijs, and M. vanderKlis (Amsterdam Univ., Netherlands) *In* NAS-NRC, High-Energy Astrophysics. American and Soviet Perspectives 1991 p 251-260 (For primary document see N92-12933 03-90)
Avail: NTIS HC/MF A18 CSCL 03B

Variability on short time scales in the x-ray flux is a very general property of binary x-ray sources. Not until after the discovery of intensity-dependent quasi-periodic oscillations (QPO) and associated red noise form luminous low-mass x-ray binaries were systematic studies of the shape of the power-spectral components made. A brief account is given of the main developments since this discovery which have led to a new picture of the properties of low-mass x-ray binaries. Author

N92-12959*# Academy of Sciences (USSR), Moscow. Sternberg Astronomical Inst.
THE EVOLUTION OF THE GRAVITATIONAL RADIATION FROM STELLAR COMPONENTS OF GALAXIES
V. M. Lipunov, E. Yu. Osminkin, and M. E. Prokhorov *In* NAS-NRC, High-Energy Astrophysics. American and Soviet Perspectives

1991 p 261-269 (For primary document see N92-12933 03-90)
Avail: NTIS HC/MF A18 CSCL 03B

The evolution is discussed of gravitational waves spectra produced by binary stars, supernova explosions, and coalescences of binary compact stars in outer galaxies. These spectra are integrated over a simple model of the universe to give an estimate of the stochastic gravitational wave background due to astrophysical sources. Author

N92-12960*# Washington Univ., Seattle.
CLOSE BINARY STARS IN GLOBULAR CLUSTERS
Bruce Margon *In* NAS-NRC, High-Energy Astrophysics. American and Soviet Perspectives 1991 p 270-284 Sponsored in part by NSF (For primary document see N92-12933 03-90)
(Contract NAS5-29293; NGT-70050)
Avail: NTIS HC/MF A18 CSCL 03B

Although close binary stars are thought theoretically to play a major role in globular cluster dynamics, virtually no non-degenerate close binaries are known in clusters. We review the status of observations in this area, and report on two new programs which are finally yielding candidate systems suitable for further study. One of the objects, a close eclipsing system in omega Cen, is also a big straggler, thus finally proving firm evidence that globular cluster blue stragglers really are binary stars. Author

N92-12961*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, MD.
THE LARGE-SCALE SURFACE BRIGHTNESS DISTRIBUTION OF THE X RAY BACKGROUND
Richard Mushotzky *In* NAS-NRC, High-Energy Astrophysics. American and Soviet Perspectives 1991 p 285-296 (For primary document see N92-12933 03-90)
Avail: NTIS HC/MF A18 CSCL 03B

The x-ray background (XRB) and the microwave background are the dominant isotropic radiation fields available for measurement. There was extensive work on trying to determine the physical origin of the background. That is, whether it is due to a superposition of numerous faint well-known sources, such as active galaxies, an early unidentified population of AGN at high redshift, a new population of objects, or to truly diffuse processes or to a superposition of these. However, while of great intrinsic interest, these studies were not aimed at using the XRB to provide the cosmological information that was gleaned from the microwave background. An alternate approach is presented, which uses the available information on the large, greater than 5 deg, scale distribution of the sky flux to see if the XRB can provide such constraints. Author

N92-12962*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, MD.
X RAY EMISSION FROM ACTIVE GALACTIC NUCLEI c93
Richard Mushotzky *In* NAS-NRC, High-Energy Astrophysics. American and Soviet Perspectives 1991 p 297-306 (For primary document see N92-12933 03-90)
Avail: NTIS HC/MF A18 CSCL 03B

There have recently been a large number of good reviews in this subject which have extensively covered the x-ray spectral and temporal properties of Seyfert galaxies and quasars in the 0.1-20 keV band. Rather then reviewing this material I concentrate on several observation issues which have been raised recently and some theoretical consequences. I also stress what the next year will bring from Ginga, Rosat, and BBXRT observations and re-analysis of Einstein data. Author

N92-12963*# Academy of Sciences (USSR), Moscow. Sternberg Astronomical Inst.
ON THE OBSERVATIONAL APPEARANCES OF A FREELY PRECESSING NEUTRON STAR IN HERCULES X-1
K. A. Postnov, M. E. Prokhorov, and N. I. Shakura *In* NAS-NRC, High-Energy Astrophysics. American and Soviet Perspectives 1991 p 307-315 (For primary document see N92-12933 03-90)
Avail: NTIS HC/MF A18 CSCL 03B

Evidence for neutron star free precession is discussed, which is often presumed to be responsible for the observed 35-day cycle in Hercules X-1. The precise formula for the period derivative due to free precession is obtained under assumption that the precession period is much longer than that of the neutron star rotation. The optical light curves to be seen from the binary, with freely precessing accretion neutron star are simulated numerically. This simulation takes into account the reflection effect on the surface of the secondary component and on the accretion disk itself for different diagrams of x-ray emission. Author

N92-12964*# Academy of Sciences (USSR), Moscow. Sternberg Astronomical Inst.
THE PSR 2127+12 AS AN INDICATOR OF A MASSIVE BLAC K HOLE IN THE CORE OF GLOBULAR CLUSTER M 15
K. A. Postnov, M. E. Prokhorov, and N. I. Shakura *In* NAS-NRC, High-Energy Astrophysics. American and Soviet Perspectives 1991 p 316-321 (For primary document see N92-12933 03-90)
Avail: NTIS HC/MF A18 CSCL 03B

The 110-millisecond pulsar PSR 2127+12 in the core of the globular cluster M15 is distinguished by having a negative period derivative P approximately equals -2 x 10(exp -17). This value cannot be provided by acceleration in the mean gravitational potential of the core. A flyby of a star approximately equal to 300 AU away could explain the P observed, but the probability of such an event is small, approximately equal to 10(exp -13). We suggest that the pulsar motion is governed by the presence of a moderately massive (approximately equals 2 divided by 3 x 10(exp 4) solar mass) black hole in the clusters center. The idea is further supported by an observed post-collapse morphology of the M15 core. Author

N92-12965*# Harvard-Smithsonian Center for Astrophysics, Cambridge, MA.
THE FORMATION AND EVOLUTION OF DOMAIN WALLS
William H. Press, Barbara S. Ryden, and David N. Spergel (Princeton Univ., NJ.) *In* NAS-NRC, High-Energy Astrophysics. American and Soviet Perspectives 1991 p 322-328 Sponsored in part by Alfred P. Sloan Foundation (For primary document see N92-12933 03-90)
(Grants NSF PHY-86-04396; NSF PHY-82-17853)
Avail: NTIS HC/MF A18 CSCL 03B

Domain walls are sheet-like defects produced when the low energy vacuum has isolated degenerate minima. The researchers' computer code follows the evolution of a scalar field, whose dynamics are determined by its Lagrangian density. The topology of the scalar field determines the evolution of the domain walls. This approach treats both wall dynamics and reconnection. The researchers investigated not only potentials that produce single domain walls, but also potentials that produce a network of walls and strings. These networks arise in axion models where the U(1) Peccei-Quinn symmetry is broken into Z sub N discrete symmetries. If N equals 1, the walls are bounded by strings and the network quickly disappears. For N greater than 1, the network of walls and strings behaved qualitatively just as the wall network shown in the figures given here. This both confirms the researchers' pessimistic view that domain walls cannot play an important role in the formation of large scale structure and implies that axion models with multiple minimum can be cosmologically disastrous. Author

N92-12966*# California Inst. of Tech., Pasadena.
A STATISTICAL ANALYSIS OF GAMMA-RAY BURSTS DETECTED BY THE KONUS EXPERIMENT ON VENERA 11 AND 12 c93
Maarten Schmidt and J. C. Higdon (Claremont McKenna Coll., CA.) *In* NAS-NRC, High-Energy Astrophysics. American and Soviet Perspectives 1991 p 329-335 (For primary document see N92-12933 03-90)
Avail: NTIS HC/MF A18 CSCL 03B

We discuss the advantages of using the V/V sub max method to test well-defined samples of gamma-ray bursts for the spatial uniformity of their parent population. We have applied the V/V sub max test to gamma ray bursts of duration longer than 1 second recorded by the Konus experiment aboard Venera 11 and 12. Based on a sample of 123 bursts, we find V/V sub max equals 0.46 plus or minus 0.03, consistent with a uniform distribution in space. We urge that experimenters give careful attention to the detection limit for each recorded gamma ray burst, and that quantitative data for burst properties and detection limits be published. Author

N92-12967*# California Inst. of Tech., Pasadena.
EXTRAGALACTIC X RAY SOURCE COUNTS
Maarten Schmidt *In* NAS-NRC, High-Energy Astrophysics. American and Soviet Perspectives 1991 p 336-343 (For primary document see N92-12933 03-90)
Avail: NTIS HC/MF A18 CSCL 03B

Extragalactic x-ray source counts carry information about the luminosity function and cosmic evolution of galaxies, BL Lac objects, Seyfort galaxies, and quasars. We discuss two available x-ray source samples with complete optical identifications and redshifts. We find evidence for instrumental bias in the detection of clusters for cosmic evolution of quasars, and of absorption effects in low luminosity Seyfert galaxies. Modest spectral and density evolution of Seyfort galaxies would allow the soft x-ray background to be made up entirely of discrete sources. We present a source count prognosis for the Advanced X-ray Astrophysics Facility (AXAF) energy range 0.5 to 10 keV. Author

N92-12968*# California Inst. of Tech., Pasadena.
ULTRALUMINOUS INFRARED GALAXIES
B. T. Soifer *In* NAS-NRC, High-Energy Astrophysics. American and Soviet Perspectives 1991 p 344-355 Sponsored in part by NSF (For primary document see N92-12933 03-90)
Avail: NTIS HC/MF A18 CSCL 03B

One of the major discoveries of the the IRAS all-sky survey was a population of sources having the bolometric luminosities of quasars, but where more than 90 percent of the luminosity emerges in the infrared. These objects, more numerous than quasars, are found exclusivly in interacting/merging galaxies that are extremely rich in interstellar gas. We have accumulated evidence that suggests that these systems are indeed quasars, obscured by many tens of magnitudes of extinction. We suggest that these Ultraluminous Infrared Galaxies are the formation stage of quasars, and that colliding galaxies, ultraluminous infrared galaxies, and quasars might be linked through an evolutionary sequence where the infrared bright phase is one in which the quasar is formed in the nucleus of a merger system, and is enshrouded in gas and dust, while the UV excess quasars are at the end state of quasar evolution where most of the enveloping dust cloud has been dissipated, and the quasar is visible directly. Author

N92-12969*# California Univ., Berkeley.
THE PECULIAR VELOCITY FIELD PREDICTED FROM THE DISTRIBUTION OF IRAS GALAXIES
Michael A. Strauss and Marc Davis *In* NAS-NRC, High-Energy Astrophysics. American and Soviet Perspectives 1991 p 356-367 Previously announced in IAA as A89-42962 (For primary document see N92-12933 03-90)
Avail: NTIS HC/MF A18 CSCL 03B

It is noted, in the wake of the recent completion of a redshift survey of about 2300 IRAS galaxies with a characteristic depth of about 4000 km/sec, that the redshift distribution obtained is entirely consistent with that of the observed optical galaxies in the direction of the Great Attractor. The IRAS velocity field also qualitatively reproduces recent observations of the spiral and elliptical galaxies. Although it is not possible to rule out the existence of excess mass in the galactic plane in the direction of the Great Attractor, this is not needed to explain the observed peculiar velocities. Author

N92-12970*# Academy of Sciences (USSR), Moscow. Space Research Inst.
X RAY RADIATION FROM SUPERNOVA 1987A. THE RESULTS OF THE KVANT MODULE IN 1987-1989
Rashid A. Sunyaev, A. S. Kaniovsky, V. V. Efremov, S. A. Grebenev, A. V. Kuznetsov, E. Churasov, M. Gilfanov, N. Yamburenko, J. Englhauser, and S. Doebereiner et al *In* NAS-NRC, High-Energy Astrophysics. American and Soviet Perspectives 1991 p 368-384 Prepared in cooperation with Max-Planck-Inst. fue r Extraterrestrische Physik, Garching (Fed. Republic of Germany); Tuebingen Univ (Fed. Republic of Germany); Space Research Lab., Utrecht (Netherlands); Birmingham Univ., (England) (For primary document see N92-12933 03-90)
Avail: NTIS HC/MF A18 CSCL 03B

The results of two years of SN1987A hard X-ray observations by the HEXE instrument aboard the Kvant module are summarized. By May to June 1989, the hard x-ray flux had declined more than 8.5 times in comparison with the maximum of the x-ray light curve. The upper limit of the ratio of Co-57/Co-56 abundances at the level of ratio of Fe-57/Fe-56 abundances at the Earth is a factor of 1.5. Author

N92-12971*# Princeton Univ., NJ.
BASIC PHYSICS AND COSMOLOGY FROM PULSAR TIMING DATA
J. H. Taylor *In* NAS-NRC, High-Energy Astrophysics. American and Soviet Perspectives 1991 p 385-393 (For primary document see N92-12933 03-90)
Avail: NTIS HC/MF A18 CSCL 03B

Radio pulsars provide unparalleled opportunities for making measurements of astrophysically interesting phenomena. The author concentrates on two particular applications of high precision timing observations of pulsars: tests of relativistic gravitation theory using the binary pulsar 1913+16, and tests of cosmological models using timing data from millisecond pulsars. New upper limits are presented for the energy density of a cosmic background of low frequency gravitational radiation. Author

N92-12972*# Academy of Sciences of the Ukrainian SSR, Kiev. Inst. of Space Research.
GAS FLOW AND GENERATION OF X RAY EMISSION IN WR+OB BINARIES
V. V. Usov *In* NAS-NRC, High-Energy Astrophysics. American and Soviet Perspectives 1991 p 394-402 (For primary document see N92-12933 03-90)
Avail: NTIS HC/MF A18 CSCL 03B

The supersonic flow of the ionized gas in WR+OB binaries and X-ray generation are considered. X-ray emission is caused by gas heating up to temperatures of 10(exp 7) to 10(exp 8) K behind the front of shock waves. These are found in the collision of gas flowing out from the WR star with either the OB star's surface or the gas of the OB star's wind. The distribution of temperature and concentration behind the shock front are obtained. Using these distributions, the spectral power of bremsstrahlung X-ray emission of hot gas is calculated. Possible reasons that lead to a considerable difference between the observed parameters of X-ray emission of the WR binary of V 444 Cygni and the theoretically expected are discussed. Author

N92-12973*# Institute for Theoretical and Experimental Physics, Moscow (USSR).
HYDRODYNAMIC STUDY OF SUPERNOVA 1987A: THE PHASE OF A WAVE OF COOLING AND RECOMBINATION
V. P. Utrobin *In* NAS-NRC, High-Energy Astrophysics. American and Soviet Perspectives 1991 p 403-409 Original language document was announced in IAA as A89-35539 (For primary document see N92-12933 03-90)
Avail: NTIS HC/MF A18 CSCL 03B

The dependence of the bolometric light curve and of the effective temperature on the density distribution in a progenitor, its chemical composition, mass, radius, and explosion energy is studied. It is shown that, just before the supernova 1987 A outburst, the outside layers of the blue supergiant Sk-69.202 deg had a

density distribution similar to that of the polytropic model with an index of n equals 3, a chemical composition with a mass fraction of hydrogen of the order of 0.1, and a relative helium abundance of about 0.9. Author

N92-12974 Max-Planck-Inst. fuer Physik und Astrophysik, Garching (Germany, F.R.).
PHYSICAL CONDITIONS AND HEATING/COOLING PROCESSES IN HIGH MASS STAR FORMATION REGIONS
Reinhard Genzel Feb. 1991 69 p Presented at Physics of Star Formation and Early Stellar Evolution, Crete, 27 May - 8 Jun. 1990 Submitted for publication
(MPE-Preprint-200; ETN-91-90312) Copyright Avail: Max-Planck Inst. fuer Physik und Astrophysik, 8046 Garching, Fed. Republic of Germany

Radiation and winds from nearby OB stars dramatically affect the physical conditions, structure, and chemistry of dense molecular clouds. Observations and theoretical models of dense clouds in regions of massive star formation and the physical processes occurring there are discussed. Dense interstellar clouds primarily consist of molecules, atoms, and dust particles. Analysis of the infrared, submillimeter and radio line, and continuum radiation from these species are primary tools for studying the physical conditions and processes in these clouds. An overview of excitation and radiative transport of line and a continuum emission in these wavelength bands is presented and it is shown how physical parameters are derived from them. Heating and cooling processes in clouds near newly formed OB stars are discussed. ESA

N92-12975# Lawrence Livermore National Lab., CA.
RADIATION-DRIVEN EVOLUTION OF LOW-MASS X RAY BINARIES AND THE FORMATION OF MILLISECOND PULSARS
M. Tavani Aug. 1991 16 p Presented at the X-ray Binaries and the Formation of Binary and Millisecond Radio Pulsars, Santa Barbara, CA, 21-25 Jan. 1991 Prepared in cooperation with California Univ., Berkeley
(Contract W-7405-eng-48)
(DE92-000123; UCRL-JC-108046; CONF-9101113-1) Avail: NTIS HC/MF A03

Recent data on low-mass X-ray binaries (LMXBs) and millisecond pulsars (MSPs) pose a challenge to evolutionary theories which neglect the effects of disk and comparison irradiation. Here we discuss the main features of a radiation-driven (RD) evolutionary model that may be applicable to several LMXBs. According to this model, radiation from the accreting compact star in LMXBs vaporizes the accretion disk and the companion star by driving a self-sustained mass loss until a sudden accretion-turn off occurs. The main characteristics of the RD-evolution are: (1) lifetime of RD-LMXB's is of order 10(exp 7) years or less; (2) both the orbital period gap and the X-ray luminosity may be consequences of RD-evolution of LMXB's containing lower main sequence and degeneration companion stars; (3) the companion star may transfer mass to the primary even if it underfills its Roche lobe; (4) a class of recycled MSPs can continue to vaporize the low-mass companions by a strong pulsar wind even after the accretion turn-off; (5) the RD-evolutionary model resolves the apparent statistical descrepancy between the number of MSPs and their LMXB progenitors in the Galaxy. We discuss the implications of the discovery of single MSPs in low-density globular clusters and the recent measurements of short orbital timescales of four LMXBs. DOE

N92-12797*# National Optical Astronomy Lab. Tucson, AZ.
ANALYSIS AND INTERPRETATION OF CCD DATA ON P/HALLEY AND PHYSICAL PARAMETERS AND ACTIVITY STATUS OF COMETARY NUCLEI AT LARGE HELIOCENTRIC DISTANCE
Michael J. S. Belton and Beatrice Mueller *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 9-10 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03B

N92-12800*# Lowell Observatory, Flagstaff, AZ.
STUDIES OF ASTEROIDS, COMETS, AND JUPITER'S OUTER SATELLITES
Edward Bowell *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 15-17 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03B

N92-12801*# Colorado Univ., Boulder. Lab. for Atmospheric and Space Physics.
EVOLUTION ON LARGE-SCALE PLASMA STRUCTURES IN COMETS: KINEMATICS AND PHYSICS
John C. Brandt *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 19-20 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03B

N92-12805*# McDonald Observatory, Austin, TX.
PHYSICAL OBSERVATIONS OF COMETS: THEIR COMPOSITION, ORIGIN AND EVOLUTION
Anita L. Cochran, Edwin S. Barker, and William D. Cochran *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 29-31 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03B

N92-12807*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, CA.
VOLATILES IN THE OUTER SOLAR SYSTEM
Dale P. Cruikshank *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 35-36 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03B

N92-12818*# Planetary Science Inst., Tucson, AZ.
STUDIES OF RELATIONSHIPS AMONG OUTER SOLAR SYSTEM SMALL BODIES AND RELATED OBJECTS
William K. Hartmann *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 57-58 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03B

N92-12819*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
PALOMAR PLANET-CROSSING ASTEROID SURVEY (PCAS)
Eleanor F. Helin *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 59-60 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03B

N92-12823*# California Univ., Davis. Dept. of Chemistry.
LASER STUDIES OF THE PHOTODISSOCIATION DYNAMICS OF COMETARY RADICALS
William M. Jackson *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 67-68 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03B

N92-12833*# Hawaii Univ., Honolulu. Inst. for Astronomy.
OBSERVATIONAL EVIDENCE OF AGING PROCESSES IN COMETS
Karen J. Meech *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 87-88 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03B

N92-12835*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
PHYSICAL PROCESSES IN COMETS
Ray L. Newburn, Jr. *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 91-92 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03B

N92-12836*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, MD.
IMAGING STUDIES OF COMETS
Malcolm B. Niedner, Jr., Daniel A. Klinglesmith, III, and David J. Westpfahl (New Mexico Inst. of Mining and Technology, Socorro.) *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 93-94 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03B

N92-12847*# Massachusetts Univ., Amherst. Five Colleges Dept. of Astronomy.
THE EVOLUTION OF YOUNG STELLAR OBJECT DISKS AND THEIR ENVIRONMENT
Stephen E. Strom, Suzan Edwards, and Karen M. Strom *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 117-120 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03B

N92-12853*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.
COMPOSITIONAL STUDIES OF PRIMITIVE ASTEROIDS
Faith Vilas *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 131-132 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03B

N92-12855*# Arizona Univ., Tucson. Lunar and Planetary Lab.
PHYSICAL STUDIES OF SMALL ASTEROIDS AND COMETARY NUCLEI
Wieslaw Z. Wisniewski *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 135-136 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03B

N92-12857*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
COMET AND ASTEROID DYNAMICS
Donald K. Yeomans *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 139-140 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03B

N92-12858*# National Optical Astronomy Lab. Tucson, AZ.
HALLEY'S SPIN STATE DETERMINED
Michael J. S. Belton *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 143 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03B

N92-12862*# Colorado Univ., Boulder.
THE LAST DISCONNECTION EVENTS IN COMET HALLEY IN APRIL 1986 Abstract Only
John C. Brandt *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 148 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03B

N92-12864*# McDonald Observatory, Austin, TX.
PHYSICAL OBSERVATIONS OF COMETS: THEIR COMPOSITION, ORIGIN AND EVOLUTION
Anita L. Cochran, Edwin S. Barker, and William D. Cochran *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 151-152 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03B

N92-12872*# California Univ., Davis.
LABORATORY SIMULATION OF THE SURFACE OF HALLEY'S COMET Abstract Only
William M. Jackson *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 162 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03B

N92-12874*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, MD.
TIME-LAPSE CCD IMAGERY OF PLASMA-TAIL MOTIONS IN COMET AUSTIN
Daniel A. Klinglesmith, III, Malcolm B. Niedner, Jr., R. J. Oliversen, and David J. Westpfahl *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 165-166 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03B

N92-12881*# Hawaii Univ., Honolulu.
OUTBURST OF COMET HALLEY AT 14.3 AU Abstract Only
Karen J. Meech *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 173 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03B

N92-12882*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
ASTEROID 1986 DA: RADAR EVIDENCE FOR A METALLIC COMPOSITION Abstract Only
Steven J. Ostro, D. B. Campbell, J. F. Chandler, A. A. Hine, R. S. Hudson, K. D. Rosema, and Irwin I. Shapiro (Smithsonian Astrophysical Observatory, Cambridge, MA.) *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 174 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03B

N92-12887*# Illinois Univ., Urbana.
OBSERVATIONS OF FORMALDEHYDE AND SEARCH FOR CYANOACETYLENE IN COMET BRORSEN-METCALF (1988o) Abstract Only
Lewis E. Snyder, Patrick Palmer, and I. dePater *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 179 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03B

N92-12890*# Hawaii Univ., Honolulu.
FIRST SPACECRAFT ENCOUNTER WITH AN ASTEROID APPROACHES
David J. Tholen *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 183 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03B

N92-12893*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.
COMPOSITIONAL STUDIES OF PRIMITIVE ASTEROIDS Abstract Only
Faith Vilas *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 186 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03B

N92-12895*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
MINOR PLANET 1566 ICARUS: ASTEROID OR COMET? Abstract Only
Donald K. Yeomans *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 188 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03B

91 LUNAR AND PLANETARY EXPLORATION

Includes planetology; and manned and unmanned flights. For spacecraft design or space stations see *18 Spacecraft Design, Testing and Performance.*

N92-12976 New Mexico State Univ., Las Cruces.
A STUDY OF THE TEMPORAL BEHAVIOR OF THE VERTICAL STRUCTURE OF JUPITER'S ATMOSPHERE Ph.D. Thesis
David Matthew Kuehn 1990 110 p
Avail: Univ. Microfilms Order No. DA9121518

In an effort to detect and quantify vertical structure changes in Jupiter's atmosphere, the planet was imaged in several wavelength passbands on five separate nights spanning two complete Jovian apparitions using a CCD camera. The wavelength passbands included broadband blue and red filters and narrowband filters in the 618, 727, 890, and 970 nm methane absorption bands. These images were photometrically calibrated using spectrophotometric standard stars. Constrained image deconvolution was used to minimize the effects of astronomical seeing on the spatial resolution of the images. Radiative transfer calculations using a multiple scattering doubling-adding method were used to construct theoretical atmospheric models capable of predicting the center-to-limb variation for belts and zones. The model consisted of one high stratospheric haze, one upper tropospheric cloud, and a lower, semi-infinite cloud. During the observation period, the SEB brightened drastically and the EZ darkened gradually. The STrZ has remained bright throughout the period. The theoretical models constructed to fit the center-to-limb variation for these regions show that the brightening of the SEB and the gradual darkening of the EZ can be explained with a change in the optical thickness of the upper cloud and a change in the single scattering albedo for the particles within the cloud. No changes in the pressure level of any of the cloud layers were necessary in the vertical structure models for the period of observation to adequately predict the center-to-limb variation of each region. Dissert. Abstr.

N92-12798*# National Optical Astronomy Lab. Tucson, AZ.
GALILEO-RELATED GROUND-BASED OBSERVATIONS OF THE JOVIAN SYSTEM
Michael J. S. Belton *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 11 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03B

N92-12799*# Massachusetts Inst. of Tech., Cambridge. Dept. of Earth, Atmospheric, and Planetary Sciences.
PHOTOMETRY OF PLUTO-CHARON MUTUAL EVENTS AND HIRAYAMA FAMILY ASTEROIDS
Richard P. Binzel *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 13-14 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03B

N92-12806*# McDonald Observatory, Austin, TX.
RADIAL VELOCITY DETECTION OF EXTRA-SOLAR PLANETARY SYSTEMS
William D. Cochran *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 33-34 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03B

N92-12808*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, MD.
SPECTROSCOPIC PLANETARY DETECTION
Drake Deming *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 37-38 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03B

N92-12809*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, MD.
STUDIES OF THERMAL WAVE PHENOMENA ON THE JOVIAN PLANETS
Drake Deming *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 39-40 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03B

N92-12811*# Arizona Univ., Tucson. Lunar and Planetary Lab.
PLANETARY SPECTROSCOPY
Uwe Fink *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 43-44 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03B

N92-12821*# Arizona Univ., Tucson. Lunar and Planetary Lab.
INTERIORS AND ATMOSPHERES OF THE OUTER PLANETS
W. B. Hubbard *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 63-64 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03B

N92-12822*# Arizona Univ., Tucson. Lunar and Planetary Lab.
STUDIES OF EXTENDED PLANETARY ATMOSPHERES
D. M. Hunten *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 65-66 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03B

N92-12829*# Lowell Observatory, Flagstaff, AZ.
OUTER PLANET STUDIES
Barry L. Lutz *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 79-80 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03B

N92-12850*# Hawaii Univ., Honolulu. Inst. for Astronomy.
STUDIES OF TRITON AND THE PLUTO-CHARON SYSTEM
David J. Tholen *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 125-126 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03B

N92-12852*# Texas Univ., Austin.
A CONTINUED PROGRAM OF PLANETARY STUDY AT THE UNIVERSITY OF TEXAS MCDONALD OBSERVATORY
L. Trafton *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 129-130 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03B

N92-12859*# National Optical Astronomy Lab. Tucson, AZ.
IO'S ATMOSPHERE DETECTED BY GROUND-BASED MICROWAVE SPECTROSCOPY
Michael J. S. Belton *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 144 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03B

N92-12860*# Lowell Observatory, Flagstaff, AZ.
DETECTION OF CN EMISSION FROM (2060) CHIRON
Edward Bowell *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 145-146 (For primary document see N92-12792 03-89)
(Grants NAGw-1470; NAGw-1864; NAGw-1886)
Avail: NTIS HC/MF A09 CSCL 03B

N92-12861*# Lowell Observatory, Flagstaff, AZ.
THE 1990 MB: THE FIRST MARS TROJAN
Edward Bowell *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 147 (For primary document see N92-12792 03-89)

(Grant NAGw-1470)
Avail: NTIS HC/MF A09 CSCL 03B

N92-12867*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, MD.
STUDIES OF THERMAL WAVE PHENOMENA ON THE JOVIAN PLANETS Abstract Only
Drake Deming *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 156 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03B

N92-12870*# Wyoming Univ., Laramie.
INFRARED SPECKLE INTERFEROMETRY AND SPECTROSCOPY OF IO
Robert R. Howell *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 159-160 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03B

N92-12871*# Arizona Univ., Tucson.
PROBING TITAN'S ATMOSPHERE WITH A STELLAR OCCULTATION
W. B. Hubbard *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 161 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03B

N92-12873*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
GOLDSTONE SOLAR SYSTEM RADAR
Raymond F. Jurgens *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 163-164 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03B

N92-12875*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, MD.
GROUND BASED INFRARED MEASUREMENTS OF THE GLOBAL DISTRIBUTION OF OZONE IN THE ATMOSPHERE OF MARS Abstract Only
Theodor Kostiuk, F. Espenak, M. J. Mumma, and D. Zipoy (Maryland Univ., College Park.) *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 167 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03B

N92-12876*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, MD.
ETHYLENE LINE EMISSION FROM THE NORTH POLE OF JUPITER Abstract Only
Theodor Kostiuk, F. Espenak, P. Romani, and J. Goldstein *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 168 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03B

N92-12877*# Arizona Univ., Tucson.
STORM ON SATURN
Stephen M. Larson *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 169 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03B

N92-12879*# Lowell Observatory, Flagstaff, AZ.
DEUTERIUM ON VENUS: OBSERVATIONS FROM EARTH Abstract Only
Barry L. Lutz, C. deBergh, B. Bezard, T. Owen, D. Crisp, and J.-P. Maillard *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 171 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03B

N92-12883*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
IO'S RADAR PROPERTIES
Steven J. Ostro, D. B. Campbell, J. F. Chandler, Irwin I. Shapiro (Smithsonian Astrophysical Observatory, Cambridge, MA.), and K. D. Rosema *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 175 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03B

N92-12884*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.
SODIUM AND POTASSIUM IN THE LUNAR ATMOSPHERE Abstract Only
A. E. Potter and T. H. Morgan *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 176 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03B

N92-12885*# Massachusetts Univ., Amherst.
RADIATIVE TRANSFER IN PLANETARY ATMOSPHERES: SUBMILLIMETER-WAVE SPECTROSCOPY OF COMETS Abstract Only
F. Peter Schloerb *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 177 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03B

N92-12888*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
ASTEROID ABSOLUTE MAGNITUDES AND SLOPE PARAMETERS Abstract Only
Edward F. Tedesco *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 180 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03B

N92-12891*# Texas Univ., Austin.
GLOBAL SCALE AURORAL EMISSIONS ON JUPITER Abstract Only
L. Trafton *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 184 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03B

N92-12892*# Texas Univ., Austin.
TENTATIVE IDENTIFICATION OF A NEWLY DISCOVERED CLASS OF MATERIAL ON IO Abstract Only
L. Trafton *In* NASA, Washington, Reports of Planetary Astronomy, 1991 Oct. 1991 p 185 (For primary document see N92-12792 03-89)
Avail: NTIS HC/MF A09 CSCL 03B

N92-12905*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.
DEGRADATION STUDIES OF MARTIAN IMPACT CRATERS Abstract Only
N. G. Barlow *In* Lunar and Planetary Inst., Abstracts for the 54th Annual Meeting of the Meteoritical Society 1991 p 1 (For primary document see N92-12901 03-90)
Avail: NTIS HC/MF A14 CSCL 03B

N92-12925*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.
Nd-142/Nd-144 IN SNCs AND EARLY DIFFERENTIATION OF A HETEROGENEOUS MARTIAN MANTLE Abstract Only
L. E. Nyquist, C. L. Harper, H. Wiesmann, B. Bansal, and C.-Y. Shih (Lockheed Engineering and Sciences Co., Houston, TX.) *In* Lunar and Planetary Inst., Abstracts for the 54th Annual Meeting of the Meteoritical Society 1991 p 178 Prepared in cooperation with NAS-NRC, Washington, DC (For primary document see N92-12901 03-90)
Avail: NTIS HC/MF A14 CSCL 03B

92 SOLAR PHYSICS

Includes solar activity, solar flares, solar radiation and sunspots.

For related information see *93 Space Radiation.*

N92-12977 Colorado Univ., Boulder.
ABSOLUTE VELOCITY MEASUREMENTS IN THE SOLAR TRANSITION REGION AND CORONA FROM OBSERVATIONS OF ULTRAVIOLET EMISSION LINE PROFILES Ph.D. Thesis
Donald M. Hassler 1990 183 p
Avail: Univ. Microfilms Order No. DA9122610

An experimental technique to measure absolute velocities of minor ions formed in the solar transition region and corona is presented. A sounding rocket experiment July 27, 1987 obtained high resolution extreme ultraviolet (EUV) spectra along a solar diameter with spatial resolution of 20 x 20 arcseconds. The center-to-limb behavior of four representative lines (Si II 1553, Fe II 1563, CIV 1548, Ne VIII 770) formed at different heights in the solar atmosphere is discussed. Assuming that horizontal motions cancel statistically so that the line-of-sight velocity approaches zero at the limb, we find a net radial downflow of approximately 7.5 +/- 1.0 km/s for C IV, 2.7 +/- 1.5 km/s for Fe II 1563, and upper limits of 0 +/- 1.2 km/s and 0 +/- 4 km/s for Si II and Ne VIII, respectively. The absolute wavelengths of each emission line were determined by direct comparison with wavelengths of known platinum lines generated by an inflight calibration lamp. We then test the assumption of line-of-sight velocity approaching zero at the limb by comparing our wavelengths with recently published laboratory rest wavelengths of the solar emission lines. We find agreement within the published uncertainties of the laboratory wavelengths. The result for Si II indicates that the next radial flow in the chromosphere is near zero, although small scale velocity structures may vary by as much as 4-6 km/sec. The center-to-limb behavior of Fe II 1563 suggests, contrary to previous thinking, that there might be a significant contribution of Fe II emission at higher temperatures characteristic of the lower transition region. Finally, the upper limit on the radial flow velocity for Ne VIII provides a constraint on the radial flow at coronal temperatures. Complicating the accurate measurement of Doppler velocities is the presence of small nonlinearities in the microchannel plates used in UV and EUV detectors which introduce small position offsets between the input and output of the detector. The results of these position offsets is a distortion in the spatial and spectral scale of the detector, causing slight shifts or deviations in the wavelength dispersion curve. Dissert. Abstr.

N92-12978 Colorado Univ., Boulder.
INFLUENCE OF WAVE-PARTICLE INTERACTIONS ON SOLAR FLARE DYNAMICS Ph.D. Thesis
Michael Elliott McKean 1990 290 p
Avail: Univ. Microfilms Order No. DA9122365

A discussion of the transfer of energy through wave particle interactions during impulsive solar flares is presented. Particle simulations are used to investigate the transport of energy across magnetic field lines by electron cyclotron maser radiation, and the conduction of energy along field lines by expanding electron populations heated during the impulsive phase. Results are applied to models for the emission of microwave spike bursts and Earth's Auroral Kilometric Radiation (AKR), both of which are probably maser emission, and for hard and soft X-ray emission. First, the propagation of maser radiation through an opaque coronal absorption layer is examined. The sources of the frequency fine structure observed in maser emission are sought. It is found that maser radiation can heat the absorption layer plasma to soft X-ray emitting temperatures. A few percent of the maser radiation can escape the absorption layer by nonlinear reemission processes. The fine structures in AKR with the highest frequency drift rates may be consequences of magnetic field inhomogeneities in the maser emission region that are caused by localized current systems. Second, the expansion of hot electrons is studied in regions of both uniform and nonuniform density. For uniform densities, contrary to the expectations of the thermal model for hard X-ray emission, no conduction front forms as the electrons expand and hence the heated region cools rapidly. For nonuniform densities, as electrons expand an ambipolar electric field forms that slows the expansion and accelerates ions outward. Two soft X-ray emission models are simulated. In the maser coronal heating model, the ambipolar field is confined to conduction front and the accelerated ions to a pressure wave. This system is unstable to ion-ion turbulence that heats heavier ions preferentially. In a chromospheric heating model, no conduction front forms and ion-ion instabilities are suppressed. Dissert. Abstr.

N92-12979 Alabama Univ., Huntsville.
THE FORMATION, STRUCTURE AND DISSIPATION OF DIRECT ELECTRIC CURRENT SYSTEMS IN THE SOLAR ATMOSPHERE Ph.D. Thesis
George Roumeliotis 1990 151 p
Avail: Univ. Microfilms Order No. DA9113973

Some of the extensive observational and theoretic evidence was assembled which suggests that the solar atmosphere above the middle chromosphere consists of a junkyard of closely packed magnetic flux tubes, which are anchored in the photosphere within isolated magnetic elements only a few hundred km across. A number of analytical models were constructed to explain the structure of current carrying magnetic configurations in the outer solar atmosphere. The atmospheric structure is examined inside a sheared magnetic boundary layer which is heated by the Joule dissipation of intense, field aligned currents. The response is studied of a Joule heated, sheared magnetic boundary layer to small scaled, transverse perturbations. And, the idea is pursued that solar flares are the signatures of rapid electric current dissipation, by modeling the effects of an impulsive magnetic energy release inside a twisted magnetic flux tube. A numerical scheme is used to follow the nonlinear evolution of the magnetic field and plasma configuration. It was found that the calculated hard x ray emission is similar to fast structures observed in solar hard x ray bursts. Dissert. Abstr.

N92-12980# National Geophysical Data Center, Boulder, CO.
SOLAR-GEOPHYSICAL DATA NUMBER 561, MAY 1991. PART 1: (PROMPT REPORTS). DATA FOR APRIL, MARCH 1991, AND LATE DATA
Helen E. Coffey, ed. May 1991 197 p
(PB91-217331; SGD-561-Pt-1; LC-79-640375; ISSN-0038-0911)
Avail: NTIS HC/MF A09 CSCL 03B

The following subject areas are covered: detailed index for 1990-1991; data for Apr. 1991 (solar terrestrial environment, IUWDS alert periods, solar activity indices, solar flares, and Stanford mean solar magnetic field); data for Mar. 1991 (solar activity regions, sudden ionospheric disturbances, solar radio spectral observations, cosmic ray measurements by neutron monitor, and geomagnetic indices); and late data (solar radio emission Feb. 1991, geomagnetic activity indices Aug. - Dec. 1990, and solar active regions Jan. 1991). GRA

N92-12981# National Geophysical Data Center, Boulder, CO.
SOLAR-GEOPHYSICAL DATA NUMBER 561, MAY 1991. PART 2: (COMPREHENSIVE REPORTS): DATA FOR NOVEMBER 1990 AND MISCELLANEOUS
Helen E. Coffey, ed. May 1991 104 p
(PB91-217349; SGD-561-Pt-2; LC-79-640375; ISSN-0038-0911)
Avail: NTIS HC/MF A06 CSCL 03B

The following subject areas are covered: detailed index for 1990-1991; and data for Nov. 1990 (solar flares, solar radio bursts at fixed frequencies, solar X-ray radiation data from the Geostationary Operational Environment Satellite, mass ejections from the Sun, active prominences and filaments). GRA

N92-12982 Max-Planck-Inst. fuer Physik und Astrophysik, Garching (Germany, F.R.).
THIRD PLASMA HARMONIC RADIATION IN TYPE 2 BURSTS
B. Kliem, A. Krueger (Academy of Sciences, Potsdam, German D.R.), and R. A. Treumann May 1991 18 p Submitted for publication

(MPE-Preprint-203; ETN-91-90315) Copyright Avail: Max-Planck Inst. fuer Physik und Astrophysik, 8046 Garching, Fed. Republic of Germany

Some observational evidence for simultaneous fundamental, second, and third harmonic radio emission during an excessively strong type II burst on February 16, 1984 is presented. This burst was emitted from an active region behind the limb allowing for good resolution of the wave bands. Three different nearly equally probable mechanisms for higher harmonic emission are qualitatively discussed, however, preferred choice is given either to a four wave process which involves very strong Langmuir waves and a decay process for higher harmonic emission near the Earth's bow shock or Langmuir wave collapse. In sufficiently strong coronal shock waves both mechanisms may even be more efficient than under solar wind conditions. Langmuir wave collapse may be driven by strong electron beams. Observations like the present one should open additional diagnostic opportunities and should stimulate further search for higher than second harmonic emission in strong solar radio bursts. ESA

93 SPACE RADIATION

Includes cosmic radiation; and inner and outer earth's radiation belts.

For biological effects of radiation see *52 Aerospace Medicine.* For theory see *73 Nuclear and High-Energy Physics.*

N92-12983 California Univ., San Diego.
NUCLEOSYNTHETIC GAMMA RAY LINES AND POSITRONS FROM SUPERNOVAE Ph.D. Thesis
Kai-wing Chan 1990 171 p
Avail: Univ. Microfilms Order No. DA9118974

Positron survival fractions, and analytical time dependent gamma ray fluxes, shapes, blueshifts and widths, expected from the radioactive decay of Ni-56 decays to Co-56 decays to Fe-56 synthesized in various types of supernovae are calculated, assuming spherically symmetric and homologous expansion of the ejecta. In the calculations of gamma ray line fluxes and profiles, Doppler shifts, attenuation, time delay effect and relativistic time dilation of the photons are considered. Photons Compton-scattered into the line of sight, distorting the line profiles, are treated in an analytical small angle scattering approximation. The most intense and most detectable lines are the 0.847 MeV and the 1.238 MeV lines from Co-56 decay. These and several other gamma ray lines from Type Ia supernovae are shown to be measurable at greater than or = 3 sigma level at large distances greater than 10 Mpc. The application of measurements of these lines to test the current models and to distinguish between the processes of nuclear deflagration, nuclear detonation and core bounce in the supernova explosion, and to study both the nucleosynthetic processes and the explosion dynamics in these supernovae are discussed. Dissert. Abstr.

N92-12984 Max-Planck-Inst. fuer Physik und Astrophysik, Garching (Germany, F.R.).
MERLIN OBSERVATIONS OF 4C29.6 (3C59) AND 4C35.37: TWO RADIO STRUCTURES MISIDENTIFIED WITH SEYFERT GALAXIES
E. J. A. Meurs and S. W. Unbger (Royal Greenwich Observatory, Cambridge, England) Jun. 1991 25 p Submitted for publication Sponsored in part by ESA, and Cambridge Univ.
(MPE-Preprint-204; ETN-91-90316) Copyright Avail: Max-Planck Inst. fuer Physik und Astrophysik, 8046 Garching, Fed. Republic of Germany

The two radio sources 4C29.6 (3C59) and 4C35.37 were identified optically with rather distant Seyfert galaxies. Observations with the MERLIN array show both cases to be misidentifications. The 4C35.37 is an unrelated, double lobed background source, whereas the Seyfert itself is not detected. The 4C29.6 appears mainly a superposition of two background sources (a core source with one sided jet, and a small scale double), while the Seyfert is also detected. The observed radio structures and the relevance of these results for our understanding of the overall radio properties of Seyferts are discussed. ESA

N92-12985# China Nuclear Information Centre, Beijing.
THE ESTIMATION OF THE DOSE FROM COSMIC RADIATION RECEIVED BY THE POPULATION LIVING AT MAINLAND OF CHINA
Hua Jin and Qingyu Yue Nov. 1989 10 p In CHINESE; ENGLISH summary
(DE91-631668; CNIC-00361; IAE-0070) Avail: NTIS HC/MF A02

The measurement of ionization distribution caused by the cosmic ray ionizing components in the air, the survey of population distribution in geography and the investigation of total passengers taking air liners at the mainland of China have been completed. By taking the data from the census of the year 1986 and the population distribution of the mainland, considering the cosmic ray distribution with the height and referring the distribution of neutron flux density in cosmic rays, the population-weighted mean annual effective dose equivalent, which is obtained from 2017 counties and 353 cities, for inhabitants living in every provinces and municipalities directly under Central Government has been calculated. The collective dose equivalent produced by the external exposure of cosmic rays is also estimated when people are taking air liners. The results which are effected by the population distribution show that the annual effective dose equivalant received by the population of China from cosmic rays is 28 lower lower than the population of the world. Most of Chinese people are living in the Northern Hemisphere area that has a lower elevation and geomagnetic latitude, and 53.6 percent of them are in the area of elevation below 100 m and 91 percent are in the area of geomagnetic latitude below 30 deg N. DOE

N92-12986# Oak Ridge National Lab., TN.
THE GAMMASPHERE
I.-Yang Lee 1991 14 p Presented at the International Conference on New Nuclear Physics With Advanced Techniques, Ierapetra (Greece), 23-29 Jun. 1991
(Contract DE-AC05-84OR-21400)
(DE92-000448; CONF-9106107-2) Avail: NTIS HC/MF A03

GAMMASPHERE is one of a new generation of gamma ray detector arrays. It consists of 100 Compton-suppressed large volume Ge detectors. The design goal is to achieve high efficiency and peak-to-total value for four to five fold coincidence experiments. Such high-fold coincidence capability will provide new physics opportunities in areas such as high spins, transfer reactions, giant resonances, and astrophysics. The design of the detector and shield has been developed through extensive simulation calculations and an electronic honeycomb design was chosen. The electronics and computer systems are capable of operating at 50,000 event/sec. The design and development tasks are being carried out at several laboratories in the US GAMMASPHERE will sited initially at the 88-Inch Cyclotron at LBL as a national facility. The first experiment is planned in early 1993. DOE

N92-12949*# Academy of Sciences (USSR), Moscow. Space Research Inst.
OBSERVATIONS OF X RAY PULSARS FROM THE KVANT MODULE
M. Gilfanov, Rashid A. Sunyaev, E. Churazov, V. Loznikov, V. V. Efremov, A. Kaniovskiy, A. V. Kuznetsov, N. Yamburenko, A. Melioranskiy, and G. K. Skinner et al *In* NAS-NRC, High-Energy Astrophysics. American and Soviet Perspectives 1991 p 134-143 Prepared in cooperation with Space Research Organization Netherlands, Utrecht; Birmingham Univ. (England); Max Planck fuer Physik and Astrophysik; and Tuebingen Univ. (Fed. Republic of Germany) (For primary document see N92-12933 03-90)
Avail: NTIS HC/MF A18 CSCL 03B

N92-12950*# Academy of Sciences (USSR), Leningrad. Central Astronomical Observatory.
GENERATION OF ULTRAHIGH-ENERGY GAMMA RAYS IN ACCRETING X RAY PULSARS
Yu. N. Gnedin and N. R. Ikhsanov *In* NAS-NRC, High-Energy Astrophysics. American and Soviet Perspectives 1991 p 144-152 Original language document was announced in IAA as A91-22005 (For primary document see N92-12933 03-90)
Avail: NTIS HC/MF A18 CSCL 03B

N92-12954*# California Univ., Berkeley.
COSMIC GAMMA-RAY BURSTS
K. Hurley *In* NAS-NRC, High-Energy Astrophysics. American and Soviet Perspectives 1991 p 204-217 Previously announced in IAA as A87-47616 Prepared in cooperation with Centre d'Etude Spatiale des Rayonnements, Toulouse (France) (For primary document see N92-12933 03-90)
Avail: NTIS HC/MF A18 CSCL 03B

N92-12956*# Abastumani Astrophysical Observatory, Georgia (USSR).
ON THE NATURE OF PULSAR RADIATION
A. Z. Kazbegi, G. Z. Machabeli, and G. I. Melikidze *In* NAS-NRC, High-Energy Astrophysics. American and Soviet Perspectives 1991 p 225-236 (For primary document see N92-12933 03-90)
Avail: NTIS HC/MF A18 CSCL 03B

N92-12962*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, MD.
X RAY EMISSION FROM ACTIVE GALACTIC NUCLEI
Richard Mushotzky *In* NAS-NRC, High-Energy Astrophysics. American and Soviet Perspectives 1991 p 297-306 (For primary document see N92-12933 03-90)
Avail: NTIS HC/MF A18 CSCL 03B

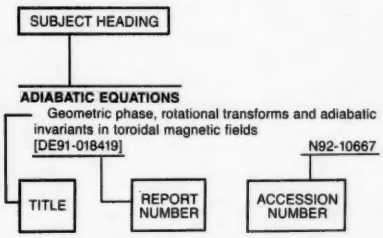
N92-12966*# California Inst. of Tech., Pasadena.
A STATISTICAL ANALYSIS OF GAMMA-RAY BURSTS DETECTED BY THE KONUS EXPERIMENT ON VENERA 11 AND 12
Maarten Schmidt and J. C. Higdon (Claremont McKenna Coll., CA.) *In* NAS-NRC, High-Energy Astrophysics. American and Soviet Perspectives 1991 p 329-335 (For primary document see N92-12933 03-90)
Avail: NTIS HC/MF A18 CSCL 03B

99 GENERAL

N92-12987# New Energy Development Organization, Tokyo (Japan).
[RESULTS AND THE FUTURE OF RESEARCH, PART 2]
Annual Report, 1988
Sep. 1989 689 p In JAPANESE
(DE90-503494; NEDOJ-P-8902-2-Pt-2) Avail: NTIS (US Sales Only) HC/MF A99

This annual report is the second volume of the reports in 3 parts on the results and future aspect of the studies made up to last year. In regard to the development of solar energy technology, reports are made on; technological development for practical application of photovoltaic power generation and industrial solar systems; development of large scale wind power generation system; and technological cooperative promotion projects. As regards the development of fuel storage technology, there are reports on development of fuel cell power generation technology, development of new type battery electric power storage system, research and development of super heat-pump energy collection system, development of ceramic gas turbine technology, development of superconductive electric power application technology, etc. In connection with the development of alcoholic and biomass technologies, reports are made on the development of fuel alcohol technology, development of high performance methane gas separation and composite production technology, and demonstration test of methanol conversion at the petroleum thermoelectric power station. As to the development of other related technologies, demonstration tests for practicalization of separate type new power generation technology and centralized load control system are reported. DOE

Typical Subject Index Listing



The subject heading is a key to the subject content of the document. Titles, report numbers, and accession numbers of pertinent documents are provided under each subject heading. When the title is insufficiently descriptive of the document content, a title extension has been added, separated from the title by three hyphens. The report number helps to indicate the type of document cited (e.g., NASA report, NASA translation, NASA contractor report). The accession number is the number by which the document abstracts are arranged in this journal and by which the document is sold or requested. The titles, with title extensions if present, are arranged under each subject heading in ascending accession number order. The subject headings have been selected from the latest revision of the *NASA Thesaurus*.

A

ABLATION
Laser ablation synthesis and properties of epitaxial YBa2Cu3O(7-delta) / PrBa2Cu3O(7-delta) superconducting superlattices
[DE92-000447] N92-12766

ABSORBERS (MATERIALS)
Structural and optical characterisation of Langmuir-Blodgett films for data storage applications N92-12780

ABSORPTION
Molecular to material design for anomalous-dispersion phase-matched second harmonic generation
[DE91-017999] N92-12683

ABSORPTION SPECTRA
Nitrogen dioxide fluorescence following photolysis in a supersonic jet
[DE90-014164] N92-12078
Interpreting measurements obtained with the cloud absorption radiometer
[NASA-CR-189241] N92-12366
Ground based infrared measurements of the global distribution of ozone in the atmosphere of Mars N92-12875
Tentative identification of a newly discovered class of material on Io N92-12892
The cyclotron absorption line and eclipse transition phenomena of 4U 1538-52 N92-12944
A study of the temporal behavior of the vertical structure of Jupiter's atmosphere N92-12976

ABSORPTION SPECTROSCOPY
Effects of ambient background gases on YBCO plume propagation under film growth conditions: Spectroscopic, ion probe, and fast photographic studies
[DE92-000431] N92-12737

ABSTRACTS
Abstracts for the 54th Annual Meeting of the Meteoritical Society
[NASA-CR-188934] N92-12901

ABUNDANCE
Spectroscopy of comets N92-12856
X ray radiation from Supernova 1987A. The results of the Kvant module in 1987-1989 N92-12970

ACCELERATED LIFE TESTS
Life testing and reliability with application in engineering systems
[AD-A240042] N92-12287

ACCELERATION (PHYSICS)
Pitching moment derivative due to rate of pitch for projectiles at supersonic speeds
[ESDU-91004] N92-11967
Performance evaluation of advanced battery technologies for electric vehicle applications
[DE90-013895] N92-12171

ACCELEROMETERS
Study and development of a pressure and acceleration sensor using a piezoelectric polymer (PVDF)
[LAAS-91154] N92-12237

ACCIDENT PREVENTION
Designing equipment for use in gamma radiation environments
[DE90-012050] N92-12162

ACCIDENTS
Update of Ulysses FSAR results using updated NASA probabilities
[DE90-012504] N92-12008

ACCRETION DISKS
The evolution of young stellar object disks and their environment N92-12847
Manifestations of dynamo driven large-scale magnetic field in accretion disks of compact objects N92-12940
Turbulization of shear flows in astrophysics N92-12941
Regular variability of the shape of the primary minimum of the orbital light curve of SS 433 with the phase of the precessional period N92-12942

ACCURACY
Smoothed Runge-Kutta methods in the method of lines
[CWI-NM-R9101] N92-12565

ACETYL COMPOUNDS
Pulsed laser fluorometry for environmental monitoring
[DE90-013163] N92-12249

ACETYLENE
Metallacumulenes and carbide complexes
[DE90-011324] N92-12073

ACHONDRITES
Ar-39-Ar-40 of achondrites: Evidence for a lunar-like cataclysm N92-12907
A liquidus phase diagram for a primitive shergottite N92-12916
Microprobe studies of microtomed particles of white druse salts in shergottite EETA 79001 N92-12921
Olivines in angrite LEW 87051: Phenos or xenos N92-12924
Iddingsite in the Nakhla meteorite: TEM study of mineralogy and texture of pre-terrestrial (Martian?) alterations N92-12929

ACID RAIN
I.S.O. international program on the study of atmospheric corrosion: Results of first year exposure at Boucherville, October 1986 - October 1987
[NRC-28896] N92-12106
The greenhouse effect and acid rain
[DE90-008347] N92-12340
Can sulfate fluxes in forest canopy throughfall be used to estimate atmospheric sulfur deposition?
[DE92-000044] N92-12356

ACOUSTIC EMISSION
Acoustic emission applied to composite material structures
[REPT-911-430-138] N92-12067
The acoustic emission characteristics of solidification and formation of casting defects in aluminum alloy 319 N92-12101

ACOUSTIC IMPEDANCE
Fredholm's alternative for impedance boundary value problems in acoustics
[FFA-TN-1990-46] N92-12600

ACOUSTIC MEASUREMENT
Position and velocity measuring system
[AD-D014975] N92-12232
Acoustic characteristics of anechoic chamber at FFA
[FFA-TN-1990-43] N92-12599

ACOUSTIC PROPAGATION
Ocean/bottom acoustic interaction with arbitrary bottom profile
[FFI-91/7009] N92-12386

ACOUSTIC SCATTERING
Waves and fields in structural acoustics: Fluid-loaded elastic cylindrical and spherical shells N92-12597

ACOUSTIC VELOCITY
Autonomous ocean profiler
[AD-A239800] N92-12383

ACOUSTICS
Position and velocity measuring system
[AD-D014975] N92-12232
Acousto-ultrasonics for adhesive bond evaluation
[NRC-LTR-ST-1799] N92-12289
Vibroacoustic Payload Environment Prediction System (VAPEPS): VAPEPS management center remote access guide
[NASA-CR-189448] N92-12292
Acoustic characteristics of anechoic chamber at FFA
[FFA-TN-1990-43] N92-12599
Fredholm's alternative for impedance boundary value problems in acoustics
[FFA-TN-1990-46] N92-12600

ACOUSTO-OPTICS
Design and testing of space-domain minimum average correlation energy (SMACE) filters for 2-D acousto-optic correlators
[DE91-019062] N92-12602
Backward collinear acousto-optic interactions in bulk materials
[NRC-29095] N92-12679

ACTIVE CONTROL
The development of a requirement specification for an experimental active flight control system for a variable stability helicopter: An Ada simulation in JSD N92-12466

ACTIVE GALACTIC NUCLEI
Optical observations of active galactic nuclei N92-12946
X ray emission from active galactic nuclei N92-12962

ACTIVE GALAXIES
The large-scale surface brightness distribution of the x ray background N92-12961

ACTIVITY (BIOLOGY)
Catalysis and biocatalysis program
[NASA-CR-189452] N92-12392

ACTUATOR DISKS
On the limitations of Froude's actuator disc concept
[ETN-91-90136] N92-11973

ACTUATORS
An analytical and experimental study to investigate flutter suppression via piezoelectric actuation
[NASA-TM-893240] N92-12173
An astigmatic unstable resonator with an intracavity deformable mirror
[DE91-018815] N92-12257
A unified motion planning approach for redundant and non-redundant manipulators with actuator constraints
[NASA-CR-189002] N92-12274
A unified motion planning approach for redundant and non-redundant manipulators with actuator constraints
[NASA-CR-189023] N92-12276

ADA (PROGRAMMING LANGUAGE)
Software for Guidance and Control
[AGARD-CP-503] N92-12449
Coprocessor support for real-time Ada N92-12454
Software design considerations for an airborne command and control workstation N92-12455
Process/object-oriented Ada software design for an experimental helicopter N92-12461
A practical experience of Ada for developing embedded software N92-12465
Software methodologies for safety critical systems N92-12467
Common Ada Missile Packages (CAMP) N92-12468

ADAPTIVE CONTROL
A unified motion planning approach for redundant and non-redundant manipulators with actuator constraints
[NASA-CR-189023] N92-12276
Supervisory autonomy in telerobotics
[NRC-31743] N92-12546
A bootstrapping approach to robot intelligence: First results
[REPT-90-068] N92-12552
ADHESION
Theoretical and experimental analysis of the fine mechanical behavior of a glued assembly with double slanting layers
[ETN-91-90277] N92-12068
ADHESION TESTS
Theoretical and experimental analysis of the fine mechanical behavior of a glued assembly with double slanting layers
[ETN-91-90277] N92-12068
Detailed behavior of a glued double layer assembly in terms of the shearing-off of joint covers N92-12069
ADHESIVE BONDING
Acousto-ultrasonics for adhesive bond evaluation
[NRC-LTR-ST-1799] N92-12289
Study of adhesive elastoplastic glued joints
[REPT-NT-24192/AQEN] N92-12308
ADHESIVES
A damage tolerance assessment of bonded repairs to CF-18 composite components. Part 1: Adhesive properties
[DREP-TM-88-25-PT-1] N92-12060
Study of adhesive elastoplastic glued joints
[REPT-NT-24192/AQEN] N92-12308
ADSORPTION
Control of catalytic hydrotreating selectivity with ammonia
[DE91-018084] N92-12091
ADVANCED VERY HIGH RESOLUTION RADIOMETER
An atlas of monthly mean distributions of GEOSAT sea surface height, SSMI surface wind speed, AVHRR/2 sea surface temperature, and ECMWF surface wind components during 1988
[NASA-CR-189029] N92-12385
ADVECTION
A concept for treating dense-gas dispersion under realistic conditions of terrain and variable winds
[DE90-012892] N92-12343
AEROACOUSTICS
A comparative analysis of XV-15 tiltrotor hover test data and WOPWOP predictions incorporating the fountain effect
[NASA-CR-189455] N92-11992
Aeroacoustics in inhomogeneous flow field
[FFA-TN-1991-30] N92-12601
AEROBRAKING
Probing Titan's atmosphere with a stellar occultation N92-12871
AERODYNAMIC BALANCE
An experimental analysis of lateral jet injection into confined swirling crossflows N92-12199
AERODYNAMIC CHARACTERISTICS
Effect of twin fins on isolated tailplane lift-curve slope
[ESDU-91009] N92-11969
On simple aerodynamic sensitivity derivatives for use in interdisciplinary optimization
[NASA-TM-104145] N92-11985
Computer programs for the calculation of dual sting pitch and roll angles required for an articulated sting to obtain angles of attack and sideslip on wind-tunnel models
[NASA-TM-104161] N92-12007
AERODYNAMIC COEFFICIENTS
Maximum lift of wings with trailing-edge flaps at low speeds
[ESDU-91014] N92-11970
AERODYNAMIC INTERFERENCE
Slotted-wall research with disk and parachute models in the DSMA low-speed wind tunnel
[DE90-013631] N92-11966
Lift-curve slope of wing-body combinations
[ESDU-91007] N92-11968
Wind tunnel tests on A4, A4.1, and A4.2 2-D airfoil models in the IAR 5-ft. wind tunnel: Boeing Commercial Airplane Company and Institute for Aerospace Research collaborative work program
[NRC-IAR-C3] N92-11975
A derivation of gross thrust for a sea-level jet engine test cell
[NRC-30165] N92-12001
Procedure for determination of three-dimensional wind tunnel wall interferences and wall adaptation in compressible subsonic flow using measured wall pressures
[DLR-FB-91-09] N92-12005
AERODYNAMIC LOADS
A review of aeronautical fatigue investigations in Sweden during the period May 1989 to April 1991
[FFA-TN-1991-24] N92-12313
AERODYNAMIC STABILITY
Investigation of the aeroelastic stability of the AFW wind-tunnel model using CAP-TSD
[NASA-TM-104142] N92-11977
Performance improvements and fuel cost savings due to leading edge modification of a vintage delta wing jet fighter
[FFA-TN-1991-22] N92-11993
AERODYNAMICS
Phenomenological modeling of the wake produced by a straight two dimensional base in subsonic flow
[REPT-90/59] N92-11982
AEROELASTIC RESEARCH WINGS
Investigation of the aeroelastic stability of the AFW wind-tunnel model using CAP-TSD
[NASA-TM-104142] N92-11977
AEROELASTICITY
Investigation of the aeroelastic stability of the AFW wind-tunnel model using CAP-TSD
[NASA-TM-104142] N92-11977
AERONAUTICAL ENGINEERING
A review of aeronautical fatigue investigations in Sweden during the period May 1989 to April 1991
[FFA-TN-1991-24] N92-12313
Bibliography of Lewis Research Center technical publications announced in 1990
[NASA-TM-103753] N92-12786
AEROSOLS
Climate Monitoring and Diagnostics Laboratory no. 18
[PB91-205559] N92-12371
Kapuskasing field study relating atmospheric stability to wind drift from aerial forest spray operations
[NRC-LTR-UA-99] N92-12372
Characterization of a rotating drum for long term studies of aerosols
[FOA-C-40261-4.5] N92-12399
AEROSPACE ENGINEERING
NASA reliability preferred practices for design and test
[NASA-TM-4322] N92-12286
Bibliography of Lewis Research Center technical publications announced in 1990
[NASA-TM-103753] N92-12786
AEROSPACE INDUSTRY
NASA reliability preferred practices for design and test
[NASA-TM-4322] N92-12286
Military and civil software standards and guidelines for guidance and control N92-12452
AEROSPACE MEDICINE
Aerospace medicine and biology: A continuing bibliography with indexes (supplement 354)
[NASA-SP-7011(354)] N92-12404
Aerospace medicine and biology: A continuing bibliography with indexes (supplement 355)
[NASA-SP-7011(355)] N92-12412
AEROSPACE PLANES
Thermographic gust wind tunnel measurements
[ONERA-RF-31/3409-PY] N92-11972
AEROSPACE SCIENCES
Bibliography of Lewis Research Center technical publications announced in 1990
[NASA-TM-103753] N92-12786
AEROSPACE SYSTEMS
Space station control center architecture N92-12016
Lessons learned in control center technologies and non-technologies N92-12026
ACLICO: An aid system for designing bonded joints
[REPT-911-430-134] N92-12146
Probabilistic Structural Analysis Methods (PSAM) for select space propulsion systems components
[NASA-CR-187199] N92-12307
Machine Intelligence for Aerospace Electronic Systems
[AGARD-CP-499] N92-12517
AEROSPACE VEHICLES
Uncertainty analysis report for Ulysses, volume 1
[DE91-013476] N92-12039
Safety Evaluation Report for Ulysses, volume 2
[DE91-013475] N92-12040
An integrated energy approach to providing power and propulsion for the Space Exploration Initiative
[DE92-000143] N92-12054
AEROTHERMODYNAMICS
An assessment and application of turbulence models for hypersonic flows
[NASA-TM-105124] N92-11984
AGING
Observational evidence of aging processes in comets N92-12833
AGRICULTURE
Processes for identifying regional influences of and responses to increasing atmospheric CO2 and climate change: The MINK project
[DE91-018606] N92-12353
Processes for identifying regional influences of and responses to increasing atmospheric CO2 and climate change: The MINK project
[DE91-018607] N92-12354
Processes for identifying regional influences of and responses to increasing atmospheric CO2 and climate change: The MINK project
[DE91-018608] N92-12355
AIR CONDITIONING
Air movement, comfort and ventilation in workstations
[DE92-000667] N92-12424
AIR DATA SYSTEMS
Development of a pneumatic high-angle-of-attack flush airdata sensing (HI-FADS) system
[NASA-TM-104241] N92-11994
AIR DEFENSE
Computer aided design of weapon system guidance and control with predictive functional control technique N92-12463
Heuristic route optimization: A model for force level route planning N92-12520
A threat management system N92-12535
AIR FLOW
Slotted-wall research with disk and parachute models in the DSMA low-speed wind tunnel
[DE90-013631] N92-11966
Spectroscopic analysis of a discharge and a post discharge within a low pressure air stream
[ETN-91-90098] N92-12086
Air movement, comfort and ventilation in workstations
[DE92-000667] N92-12424
AIR INTAKES
Humidity effects on gas turbine performance
[NRC-30241] N92-11998
Turbulence control by intake
[CERT-RF-67/5004-37] N92-12211
Study of detached turbulent flow in an air intake by means of high speed tomography and laser velocimetry
[REPT-90/55] N92-12216
AIR NAVIGATION
Engineering Graphical Analysis Tool (EGAT) development program N92-12542
AIR POLLUTION
The potential impact of conservation and alternative energy sources on carbon dioxide emissions
[DE90-008346] N92-12339
Ecological Research between the Univ. of Georgia and DOE. Volume 1: Main report
[DE90-012109] N92-12341
Objective method for assessing monitoring networks
[DE90-505577] N92-12346
Three-dimensional forecasting models on a desk-top computer
[DE90-010612] N92-12347
Managing global climate change through international cooperation: Lessons from prior resource management efforts
[DE90-014699] N92-12350
Monitoring IACP samples and construction of a centralized database
[PB91-213546] N92-12351
Single-column ion chromatography of passive monitors for atmospheric pollution
[NRC-28893] N92-12352
Processes for identifying regional influences of and responses to increasing atmospheric CO2 and climate change: The MINK project
[DE91-018606] N92-12353
Processes for identifying regional influences of and responses to increasing atmospheric CO2 and climate change: The MINK project
[DE91-018607] N92-12354
Processes for identifying regional influences of and responses to increasing atmospheric CO2 and climate change: The MINK project
[DE91-018608] N92-12355
Priority pollutant analysis of MHD-derived combustion products
[DE90-012630] N92-12689
AIR QUALITY
Climate Monitoring and Diagnostics Laboratory no. 18
[PB91-205559] N92-12371
AIR SAMPLING
Chemical analysis of trace substances from explosives
[DE91-017833] N92-12084
AIR TRANSPORTATION
Requirements and possible technical solutions derived from the new airmobility concept of the German Army
[MBB-UD-0596-91-PUB] N92-12590

AIRBORNE EQUIPMENT
SAR imaging of vortex ship wakes. Volume 3: An overview of pre-ERS-1 observations and models
[FFI-91/7007-VOL-3] N92-12157
AIRBORNE/SPACEBORNE COMPUTERS
Integrated Communications, Navigation, Identification, Avionics (ICNIA) expert system for fault tolerant avionics N92-12539
A development-memory approach for enhancing avionics software logistics N92-12540
AIRCRAFT COMMUNICATION
Integrated Communications, Navigation, Identification, Avionics (ICNIA) expert system for fault tolerant avionics N92-12539
AIRCRAFT CONTROL
Application of Eigenstructure Assignment to the control of powered lift combat aircraft
[RAE-TM-FS-1009] N92-12004
AIRCRAFT DESIGN
Practical input optimization for aircraft parameter estimation experiments N92-11989
NASA reliability preferred practices for design and test
[NASA-TM-4322] N92-12286
AIRCRAFT EQUIPMENT
Corrosion and your aircraft
[NRC-30465] N92-11991
Integrated Communications, Navigation, Identification, Avionics (ICNIA) expert system for fault tolerant avionics N92-12539
AIRCRAFT GUIDANCE
Tracking performance requirements for rotorcraft instrument approaches to reduced minima. Phase 1: Preliminary study
[NRC-32137-PHASE-1] N92-11988
A methodology for software specification and development based on simulation N92-12458
AIRCRAFT INSTRUMENTS
Tracking performance requirements for rotorcraft instrument approaches to reduced minima. Phase 1: Preliminary study
[NRC-32137-PHASE-1] N92-11988
A development-memory approach for enhancing avionics software logistics N92-12540
AIRCRAFT MAINTENANCE
Corrosion and your aircraft
[NRC-30465] N92-11991
A knowledge-based assistant for diagnosis in aircraft maintenance N92-12538
AIRCRAFT PILOTS
Integrating machine intelligence into the cockpit to aid the pilot N92-12533
A threat management system N92-12535
AIRCRAFT SAFETY
Corrosion and your aircraft
[NRC-30465] N92-11991
AIRCRAFT STRUCTURES
Corrosion and your aircraft
[NRC-30465] N92-11991
AIRFOIL PROFILES
Wind tunnel tests on A4, A4.1, and A4.2 2-D airfoil models in the IAR 5-ft. wind tunnel: Boeing Commercial Airplane Company and Institute for Aerospace Research collaborative work program
[NRC-IAR-C3] N92-11975
AIRFOILS
The BCAC/IAR collaborative research program to investigate the sidewall boundary layer effects in the IAR/NRC 2-D High Reynolds Number Test Facility
[NRC-HSA-434] N92-11976
AIRGLOW
Workshop on Artificially Ionized Layers in the Atmosphere
[DE90-013470] N92-12358
ALGEBRA
Formal specification of satellite telemetry: A practical experience N92-12456
Program calculation properties of continuous algebras
[CWI-CS-R9104] N92-12484
Process algebra with signals and conditions
[CWI-CS-R9103] N92-12510
Algebraic calculation of stroboscopic maps of ordinary, nonlinear differential equations
[DE92-000220] N92-12578
Concept lattices with anti-endomorphism
[ETN-91-90182] N92-12594
ALGORITHMS
Practical input optimization for aircraft parameter estimation experiments N92-11989
A numerically-stable algorithm for calibrating single six-ports for national microwave reflectometry
[NPL-DES-102] N92-12158
Optimal realization of multistage cascade circuits
[ETN-91-90165] N92-12182
The AFDM (Advanced Fluid Dynamics Model) program: Scope and significance
[DE90-010585] N92-12193
The NRCC three-dimensional image data files
[NRC-29077] N92-12234
Autonomous trajectory generation for mobile robots with non-holonomic and steering angle constraints
[DE90-012298] N92-12268
The variable polarity plasma arc welding process: Characteristics and performance
[NASA-CR-184259] N92-12279
Constraint treatment techniques and parallel algorithms for multibody dynamic analysis N92-12297
MERIS data compression: A presentation of the current status of the study
[REPT-911-440-113] N92-12322
A standard test set for numerical approximations to the shallow water equations in spherical geometry
[DE92-000385] N92-12365
Three dimensional reconstruction of vascular networks in trinocular vision
[TELECOM-PARIS-90-E-022] N92-12406
SAR data compression: Application, requirements, and designs N92-12428
Scientific requirements for space science data systems N92-12429
Data compression for data archival, browse or quick-look N92-12431
Techniques for containing error propagation in compression/decompression schemes N92-12433
Gridless electrostatic field solver for particle simulation codes in cylindrical geometry
[DE90-013602] N92-12445
A research program in finite element analysis and iterative solution on advanced processors
[DE90-013958] N92-12446
Formal verification of a redundancy management algorithm N92-12457
Joint carrier phase estimation and symbols decoding of trellis codes
[TELECOM-PARIS-91-C-003] N92-12473
Segmentation of complex geometric forms by the curvature method
[NRC-31210] N92-12475
Algorithms and VLSI architecture designs for image transformation in real time
[TELECOM-PARIS-90-E-021] N92-12489
On a generalized Polak-Ribiere algorithm for unconstrained minimization
[MATHS-REPT-A-148] N92-12491
Authentication of byte sequences
[DE92-000150] N92-12492
A highly parallel multigrid-like method for the solution of the Euler equations
[NASA-CR-188816] N92-12496
Automated threat response recommendation in environments of high data uncertainty using the Countermeasure Association Technique (CMAT) N92-12525
Locally linear neural networks for aerospace navigation systems N92-12530
Machine learning: An approach based on classifier systems and evolutionary algorithms
[REPT-90-043] N92-12550
A bootstrapping approach to robot intelligence: First results
[REPT-90-068] N92-12552
New perspectives about default hierarchies formation in learning classifier systems
[REPT-91-002] N92-12553
Three-dimensional explicit depth migration via McClellan transformations on hexagonal sampling grids
[DE91-017370] N92-12558
A minimum prediction error algorithm for estimation of periodic ARMA models
[REPT-90-016] N92-12573
Motivating quasi-Newton updates by preconditioned conjugate gradient methods
[MATHS-REPT-A-150] N92-12577
On finding minimum-diameter clique trees
[DE92-000386] N92-12579
Semi-stochastic approximation by the Response Surface Methodology (RSM)
[ETN-91-90210] N92-12581
System-based component test problem: The design of optimum system based component test plans N92-12587
Solving the discretized time-independent Schroedinger equation in the Lanczos procedure N92-12630
Properties of liquid water and carbon dioxide from constant pressure-constant temperature molecular dynamics
[DE91-018219] N92-12633
Full surface testing of grazing incidence mirrors
[AD-A240356] N92-12676
An algorithm for determining EF coils from fixed-boundary equilibria applied to ARIES 3
[DE92-000170] N92-12730
ALKANES
Diffraction by macromolecular fluids
[DE91-016219] N92-12089
ALLENDE METEORITE
Evaluation of the Strecker synthesis as a source of amino acids on carbonaceous chondrites N92-12920
ALLOYING
Synthesis of Al/Al3Ti two-phase alloys by mechanical alloying
[DE92-000193] N92-12117
ALLOYS
Recent progress in the development of materials for fusion reactors
[DE91-016283] N92-12722
ALPHA PARTICLES
Finite orbit energetic particle linear response to toroidal Alfven Eigenmodes
[DE91-018418] N92-12612
Kinematic measurement of alpha particles accompanied by spontaneous fission of Cf-252
[ETN-91-90175] N92-12618
ALPHABETS
Some methods of encoding simple visual images for use with a sparse distributed memory, with applications to character recognition
[NASA-CR-188848] N92-12436
ALTERNATIVES
A plan for the study of the costs and environmental impact of fusion compared with alternative energy sources
[DE90-013068] N92-12696
ALUMINIDES
Weldability of iron aluminides
[DE90-012722] N92-12096
The effect of casting temperature on the fatigue properties of cast nickel aluminide alloys
[DE92-000432] N92-12118
ALUMINUM
I.S.O. international program on the study of atmospheric corrosion: Results of first year exposure at Boucherville, October 1986 - October 1987
[NRC-28896] N92-12106
ALUMINUM ALLOYS
A brief review of wrought aluminum alloy metal matrix composites reinforced by silicon carbide whiskers
[NRC-LTR-ST-1765] N92-12058
Development of surface treatments and alloy modifications for corrosion-resistant oxide scales
[DE90-012723] N92-12097
Designing precipitation-strengthened iron-aluminides for high-temperature applications
[DE90-013832] N92-12100
The acoustic emission characteristics of solidification and formation of casting defects in aluminum alloy 319 N92-12101
Ageing characteristics of dendritic and non-dendritic (stir-cast) Zn-Al alloy (ZA-27)
[NRC-28906] N92-12107
PVD layers for corrosion protection of high strength Al-alloys
[MBB-Z-0360-91-PUB] N92-12108
Creep in L1(2)-intermetallics
[DE91-018231] N92-12112
Synthesis of Al/Al3Ti two-phase alloys by mechanical alloying
[DE92-000193] N92-12117
The effect of casting temperature on the fatigue properties of cast nickel aluminide alloys
[DE92-000432] N92-12118
On the formation of a joint during cold welding
[DE91-017672] N92-12275
ALUMINUM OXIDES
Material and lubricant relationships in the tribology of internal combustion engines
[DE92-000674] N92-12284
ALUMINUM-LITHIUM ALLOYS
Fatigue crack propagation rates of experimental aluminum lithium sheet and plate alloys
[ESDU-91015] N92-12102
AMBIENT TEMPERATURE
Maintaining optimum light output with a thermally conductive heat pipe
[DE90-012423] N92-12195
AMINO ACIDS
Molecular analysis of beta-lactamases from four species of Streptomyces: Comparison of amino acid sequences with those of other beta-lactamases N92-12395
Evaluation of the Strecker synthesis as a source of amino acids on carbonaceous chondrites N92-12920
Modification of amino acids at shock pressures of 3 to 30 GPA: Initial results N92-12926
AMMONIA
Control of catalytic hydrotreating selectivity with ammonia
[DE91-018084] N92-12091

AMMONIUM CHLORIDES
An experimental study of the volatility of ammonium chloride from aqueous solutions to high temperatures
[DE91-017875] N92-12090
AMMONIUM SULFATES
Simultaneous determination of optical and thermodynamic properties of an evaporating aqueous solution droplet
[DE90-010652] N92-12767
AMORPHOUS SILICON
Research on stable, high-efficiency, amorphous silicon multijunction modules
[DE91-015002] N92-12335
AMPLIFICATION
Narrow-bandwidth diffraction-limited coupled stable-unstable resonator laser cavity
[AD-D014974] N92-12251
Improved KrF laser design for the Laboratory Microfusion Facility
[DE92-000171] N92-12259
AMPLIFIERS
Characterization and development report for the 381558
[DE90-010395] N92-12161
Flashlamp pumping of Nd:glass disk amplifiers
[DE90-013482] N92-12703
ANALOG CIRCUITS
Integrated, non-volatile, high-speed analog random access memory
[NASA-CASE-NPO-17998-1-CU] N92-12438
ANALYSIS (MATHEMATICS)
A synthesis process for the optimization of the radiation properties of microstrip antennas
[ETN-91-90155] N92-12155
ANECHOIC CHAMBERS
Acoustic characteristics of anechoic chamber at FFA
[FFA-TN-1990-43] N92-12599
ANEMOMETERS
Study of interactions on anemoclinometric sensors
[REPT-90/30] N92-12006
ANGLE OF ATTACK
Development of a pneumatic high-angle-of-attack flush airdata sensing (HI-FADS) system
[NASA-TM-104241] N92-11994
Computer programs for the calculation of dual sting pitch and roll angles required for an articulated sting to obtain angles of attack and sideslip on wind-tunnel models
[NASA-TM-104161] N92-12007
ANGULAR MOMENTUM
Halley's spin state determined N92-12858
ANGULAR VELOCITY
Research program in experimental high energy physics, task B
[DE90-013323] N92-12660
The spin down of the radio pulsars: Braking index N92-12936
ANISOTROPIC MEDIA
Backward collinear acousto-optic interactions in bulk materials
[NRC-29095] N92-12679
ANISOTROPY
Phase diagram of anisotropic two-dimensional quarter-filled band of interacting electrons
[DE90-013171] N92-12748
ANNEALING
Evaluation of the fabricability of advanced austenitic tubing
[DE91-017158] N92-12109
The effect of working process on hydrogenate orientation of Zr-4 alloy tube
[DE91-629474] N92-12114
Low temperature annealing and cathodoluminescence studies of type 1 chondrule compositions N92-12913
ANNULAR FLOW
An experimental and computational investigation of an annular reverse-flow combustor
[UTIAS-338] N92-11996
ANODES
Fabrication and assembly of BOLVAPS (boil-off lithium vapor source) ceramic-option half anodes
[DE90-012012] N92-12661
ANTENNA DESIGN
A synthesis process for the optimization of the radiation properties of microstrip antennas
[ETN-91-90155] N92-12155
ANTENNA RADIATION PATTERNS
A synthesis process for the optimization of the radiation properties of microstrip antennas
[ETN-91-90155] N92-12155
ANTENNAS
Ground-based millimeter wave Cloud Profiling Radar System (CPRS).
[DE91-018373] N92-12159
ANTIBIOTICS
A molecular analysis of beta-lactamases and their promotors in Streptomyces
[FOA-B-40392-4.4] N92-12393
ANTIPROTONS
Theoretical nuclear physics
[DE92-000022] N92-12615
Measurement of rho, the ratio of the real to imaginary part of the (-p)p forward elastic scattering amplitude, at (radical)s = 1.8 TeV
[DE92-000155] N92-12637
Search for new particles in CDF
[DE92-000638] N92-12655
APERTURES
Numerical and experimental study of curved and planar frequency selective surfaces with arbitrary illumination
[NASA-TM-104540] N92-12185
APL (PROGRAMMING LANGUAGE)
Integration of applicative and object oriented programming
[ETN-91-90168] N92-12478
APPLICATIONS PROGRAMS (COMPUTERS)
Investigation of the aeroelastic stability of the AFW wind-tunnel model using CAP-TSD
[NASA-TM-104142] N92-11977
Interpreting measurements obtained with the cloud absorption radiometer
[NASA-CR-189241] N92-12366
A methodology for software specification and development based on simulation N92-12458
Process/object-oriented Ada software design for an experimental helicopter N92-12461
Analyst workbench N92-12464
Pilot's associate: Evolution of a functional prototype N92-12531
Helicopter main-rotor speed effects: A comparison of predicted ranges of detection from the aural detection program ICHIN and the electronic detection program ARCAS
[NASA-TM-104134] N92-12598
APPROACH CONTROL
Tracking performance requirements for rotorcraft instrument approaches to reduced minima. Phase 1: Preliminary study
[NRC-32137-PHASE-1] N92-11988
APPROXIMATION
A standard test set for numerical approximations to the shallow water equations in spherical geometry
[DE92-000385] N92-12365
Some simple bounds for approximations of sigmoidal functions in layered neural nets
[REPT-90-022] N92-12511
A method of computing smooth transitions between a sequence of straight line paths for an autonomous vehicle
[NRC-31776] N92-12547
Algebraic error analysis for surface curvatures of 3-D range images
[NRC-30297] N92-12559
A process for the calculation by approximation of the Preisach operator with usual differential equation applications
[ETN-91-90157] N92-12561
Semi-stochastic approximation by the Response Surface Methodology (RSM)
[ETN-91-90210] N92-12581
A local limit theorem for L-statistics
[CWI-BS-R9033] N92-12582
CEPA-type size consistency corrections for MRSDCI calculations, MRCEPA N92-12631
AQUEOUS SOLUTIONS
Measurements of heat and mass transfer coefficients during absorption of water vapor by lithium bromide and (Li,K,Na)NO3 mixtures
[DE91-014212] N92-12088
Simultaneous determination of optical and thermodynamic properties of an evaporating aqueous solution droplet
[DE90-010652] N92-12767
ARC WELDING
Weldability of iron aluminides
[DE90-012722] N92-12096
Computer modeling of arc welds to predict effects of critical variables on weld penetration
[DE92-000428] N92-12283
ARCHITECTURE
Space station control center architecture N92-12016
ARCHITECTURE (COMPUTERS)
Control Center Technology Conference Proceedings
[NASA-CP-10081] N92-12010
B-2 and other current flight test control center system architectures N92-12011
Kennedy Space Center Launch Processing System (LPS) and the Test Checkout and Monitoring System 2 (TCMS2) N92-12013
NASA Ames-Dryden integrated test facility: Presentation outline N92-12014
Huntsville Operations Support Center N92-12024
Sensory processing and world modeling for an active ranging device
[NASA-CR-188915] N92-12319
A scalable coherent cache system with incomplete directory state
[DE90-010862] N92-12434
A special function coprocessor for level-2
[DE90-013327] N92-12435
An independent review of the Multi-Path Redundant Avionics Suite (MPRAS) architecture assessment and characterization report
[NASA-CR-188126] N92-12440
A research program in finite element analysis and iterative solution on advanced processors
[DE90-013958] N92-12446
Software design considerations for an airborne command and control workstation N92-12455
Algorithms and VLSI architecture designs for image transformation in real time
[TELECOM-PARIS-90-E-021] N92-12489
Real-time VLSI architecture for geometric image transformations N92-12490
Networking standards N92-12499
Performance analysis of LAN bridges and routers N92-12501
Neural network solutions to mathematical models of parallel search for optimal trajectory generation N92-12527
A NASA/RAE cooperation in the development of a real-time knowledge based autopilot N92-12528
AI for RPVs, Sensor Driven Airborne Replanner (SDAR), for a Robotic Aircraft Sensor Platform (RASP) N92-12534
Engineering Graphical Analysis Tool (EGAT) development program N92-12542
JAZELLE: An enhanced data management system for high energy physics
[DE90-013571] N92-12662
A distributed agent architecture for real-time knowledge-based systems: Real-time expert systems project, phase 1
[NASA-CR-188947] N92-12781
ARCTIC REGIONS
Outer continental shelf environmental assessment program. Volume 73: Final Reports of principal investigators
[PB91-204917] N92-12382
ARGON ISOTOPES
Ar-39-Ar-40 of achondrites: Evidence for a lunar-like cataclysm N92-12907
Cosmogenic Ar-36 from neutron capture by Cl-35 in the Chico L6 chondrite: Additional evidence for large shielding N92-12914
ARGON PLASMA
The variable polarity plasma arc welding process: Characteristics and performance
[NASA-CR-184259] N92-12279
A wall stabilized arc as a light source for spectroscopic techniques
[ETN-91-90308] N92-12715
Characteristic quantitites of a cascade arc used as a light source for spectroscopic techniques N92-12716
The continuum emission of an arc plasma N92-12717
The VUV emissivity of a high pressure cascade argon arc from 125 to 200 nm N92-12718
The a-Si:H films produced by an expanding argon-silane plasma investigated with spectroscopic infrared ellipsometry N92-12721
ARID LANDS
Carbon and oxygen isotope composition of carbonates from an L6 chondrite: Evidence for terrestrial weathering from the Holbrook meteorite N92-12928
ARMED FORCES (FOREIGN)
Requirements and possible technical solutions derived from the new airmobility concept of the German Army
[MBB-UD-0596-91-PUB] N92-12590
ARRAYS
Fast Optically Sensitive Segmented Array (FOSSA)
[DE91-018997] N92-12684
ARTIFICIAL INTELLIGENCE
SHARP: Spacecraft Health Automated Reasoning Prototype N92-12020
Future applications of artificial intelligence to Mission Control Centers N92-12032
ACLICO: An aid system for designing bonded joints
[REPT-911-430-134] N92-12146
Planning and reasoning in the JPL telerobot testbed
[NASA-CR-189038] N92-12278
Sensory processing and world modeling for an active ranging device
[NASA-CR-188915] N92-12319

Automatic programming of simulation models [NASA-CR-184221] N92-12448
Machine Intelligence for Aerospace Electronic Systems [AGARD-CP-499] N92-12517
Machine intelligence for survivable communications network management N92-12518
A distributed environment for testing cooperating expert systems N92-12519
A synergistic approach to reasoning for autonomous satellites N92-12522
Spacecraft electrical power system fault detection/diagnosis and resource management N92-12523
TACAID: A knowledge based system for tactical decision making N92-12524
Locally linear neural networks for aerospace navigation systems N92-12530
Development of tactical decision aids N92-12532
Integrating machine intelligence into the cockpit to aid the pilot N92-12533
AI for RPVs, Sensor Driven Airborne Replanner (SDAR), for a Robotic Aircraft Sensor Platform (RASP) N92-12534
A threat management system N92-12535
C3I graphical applications N92-12541
Engineering Graphical Analysis Tool (EGAT) development program N92-12542
Machine learning: An approach based on classifier systems and evolutionary algorithms [REPT-90-043] N92-12550
A bootstrapping approach to robot intelligence: First results [REPT-90-068] N92-12552
New perspectives about default hierarchies formation in learning classifier systems [REPT-91-002] N92-12553

ARTIFICIAL SATELLITES
Advanced Satellite Workstation (ASW) N92-12521
A synergistic approach to reasoning for autonomous satellites N92-12522

ASPECT RATIO
Effect of twin fins on isolated tailplane lift-curve slope [ESDU-91009] N92-11969
The BCAC/IAR collaborative research program to investigate the sidewall boundary layer effects in the IAR/NRC 2-D High Reynolds Number Test Facility [NRC-HSA-434] N92-11976

ASSEMBLIES
Theoretical and experimental analysis of the fine mechanical behavior of a glued assembly with double slanting layers [ETN-91-90277] N92-12068

ASTEROID BELTS
Planetary astronomy N92-12863
First spacecraft encounter with an asteroid approaches N92-12890

ASTEROIDS
Reports of planetary astronomy, 1991 [NASA-TM-4329] N92-12792
Observations of comets and asteroids N92-12793
Infrared spectral studies of asteroids N92-12796
Photometry of Pluto-Charon mutual events and Hirayama family asteroids N92-12799
Studies of asteroids, comets, and Jupiter's outer satellites N92-12800
Infrared observations of small solar system bodies N92-12802
Physical observations of comets: Their composition, origin and evolution N92-12805
Volatiles in the outer solar system N92-12807
Occultation studies of the solar system N92-12810
Planetary Spectroscopy N92-12811
Surveying of the solar system N92-12813
Asteroid photometry N92-12817
Studies of relationships among outer solar system small bodies and related objects N92-12818
Palomar Planet-Crossing Asteroid Survey (PCAS) N92-12819
Astrometric observations of comets and asteroids and subsequent orbital investigations N92-12830
Occultation studies of the solar system N92-12834
Radar investigation of asteroids and planetary satellites N92-12837
Planetary astronomy N92-12844
Visible and infrared investigations of planet-crossing asteroids and outer solar system objects N92-12851
Compositional studies of primitive asteroids N92-12853
Astrometric observations of comets and minor planets N92-12854
Physical studies of small asteroids and cometary nuclei N92-12855
Comet and asteroid dynamics N92-12857
The 1990 MB: The first Mars Trojan N92-12861
Planetary astronomy N92-12863
Detection of solid C(triple bond)N bearing materials on solar system bodies N92-12866
Discovery of near-Earth asteroids by CCD scanning N92-12868
Palomar Planet-Crossing Asteroid Survey (PCAS) January 1990 - February 1991 N92-12869
Asteroid 1986 DA: Radar evidence for a metallic composition N92-12882
Radar studies in the solar system N92-12886
Asteroid absolute magnitudes and slope parameters N92-12888
First spacecraft encounter with an asteroid approaches N92-12890
Compositional studies of primitive asteroids N92-12893
Astrometric observations of comets and minor planets N92-12894
Minor planet 1566 Icarus: Asteroid or comet? N92-12895

ASTROMETRY
Studies of asteroids, comets, and Jupiter's outer satellites N92-12800
Allegheny Observatory search for planetary systems N92-12812
Astrometric observations of comets and asteroids and subsequent orbital investigations N92-12830
Observational evidence of aging processes in comets N92-12833
Radar investigation of asteroids and planetary satellites N92-12837
Visible and infrared investigations of planet-crossing asteroids and outer solar system objects N92-12851
Astrometric observations of comets and minor planets N92-12854
Astrometric observations of comets and minor planets N92-12894
Minor planet 1566 Icarus: Asteroid or comet? N92-12895

ASTRONOMICAL MODELS
Generation of auroral kilometric radiation in upper hybrid wave-lower hybrid soliton interaction [MPE-PREPRINT-202] N92-12364
Radiative transfer in planetary atmospheres N92-12842
Spectroscopy of comets N92-12856
Comet and asteroid dynamics N92-12857
Halley's spin state determined N92-12858
Nonthermal synchrotron pair cascades in strong magnetic fields: A gamma ray burst emission model N92-12899
Instabilities in SN1987A and other supernovae N92-12934
Chaotic inflationary universe and the anisotropy of the large-scale structure N92-12943
Optical observations of active galactic nuclei N92-12946
The evolution of the gravitational radiation from stellar components of galaxies N92-12959
Basic physics and cosmology from pulsar timing data N92-12971
Physical conditions and heating/cooling processes in high mass star formation regions [MPE-PREPRINT-200] N92-12974

ASTRONOMICAL OBSERVATORIES
Astrometric observations of comets and asteroids and subsequent orbital investigations N92-12830
Imaging studies of comets N92-12836
Observations of x ray pulsars from the Kvant module N92-12949

ASTRONOMICAL PHOTOGRAPHY
Research in planetary Astronomy N92-12831
Imaging studies of comets N92-12836
Ground-based observations of comets, the Jupiter plasma Torus, and Io N92-12840

ASTRONOMICAL PHOTOMETRY
Occultation studies of the solar system N92-12834
Groundbased cometary studies N92-12841
Visible and infrared investigations of planet-crossing asteroids and outer solar system objects N92-12851
Physical studies of small asteroids and cometary nuclei N92-12855
Detection of CN emission from (2060) Chiron N92-12860
Cataclysmic variables in globular clusters and low mass x ray binaries N92-12897

ASTRONOMICAL SPECTROSCOPY
The MPE/UCB far-infrared imaging Fabry-Perot interferometer (FIFI) [NASA-CR-185495] N92-12242
Theoretical spectroscopy of comets N92-12794
Spectroscopic planetary detection N92-12808
Infrared speckle interferometry and spectroscopy of Io N92-12820
Infrared variability of Jupiter and Saturn N92-12825
Advanced infrared astronomy N92-12826
Cometary spectroscopy and imaging N92-12827
The radial velocity search for extrasolar planets N92-12832
Physical processes in comets N92-12835
Observational studies of the exospheres of the Moon and Mercury N92-12839
Ground-based observations of comets, the Jupiter plasma Torus, and Io N92-12840
Groundbased cometary studies N92-12841
Radiative transfer in planetary atmospheres N92-12842
Spatially resolved quantitative spectroscopy of comets N92-12846
A continued program of planetary study at the University of Texas McDonald Observatory N92-12852
Compositional studies of primitive asteroids N92-12853
Spectroscopy of comets N92-12856
Io's atmosphere detected by ground-based microwave spectroscopy N92-12859
Detection of CN emission from (2060) Chiron N92-12860
Physical observations of comets: Their composition, origin and evolution N92-12864
Radiative transfer in planetary atmospheres: Submillimeter-wave spectroscopy of comets N92-12885
Cataclysmic variables in globular clusters and low mass x ray binaries N92-12897
Methanol in the sky with diamonds N92-12903

ASTRONOMY
Observation model and parameter partials for the JPL VLBI parameter estimation software MODEST/1991 [NASA-CR-189035] N92-12481
Planetary astronomy N92-12804
Storm on Saturn N92-12877

ASTROPHYSICS
A search for the coherent production of axions in the milli eV range [DE92-000439] N92-12650
Planetary astronomy N92-12844
Cs-135 - Ba-135: A new cosmochronometric constraint on the origin of the Earth and the astrophysical site of the origin of the solar system N92-12915
High-Energy Astrophysics. American and Soviet Perspectives [NASA-CR-186558] N92-12933
Turbulization of shear flows in astrophysics N92-12941
Cosmic gamma-ray bursts N92-12954

ASYMPTOTIC METHODS
Two nonparametric estimators of the survival function of bivariate right censored observations [CWI-BS-R9035] N92-12583
Derivation of the high field semiconductor equations [DE92-000249] N92-12763

ATMOSPHERIC CHEMISTRY
The greenhouse effect and acid rain [DE90-008347] N92-12340
Single-column ion chromatography of passive monitors for atmospheric pollution [NRC-28893] N92-12352
Infrared variability of Jupiter and Saturn N92-12825
Advanced infrared astronomy N92-12826

ATMOSPHERIC CIRCULATION
Can sulfate fluxes in forest canopy throughfall be used to estimate atmospheric sulfur deposition? [DE92-000044] N92-12356
Numerical studies of the role of clouds in the present climate [DE90-014345] N92-12370
Infrared variability of Jupiter and Saturn N92-12825

ATMOSPHERIC COMPOSITION
Report of a workshop on using remote sensing to estimate land use change [DE90-011278] N92-12318
The potential impact of conservation and alternative energy sources on carbon dioxide emissions [DE90-008346] N92-12339
The greenhouse effect and acid rain [DE90-008347] N92-12340
Objective method for assessing monitoring networks [DE90-505577] N92-12346
Transformation and deposition of atmospheric nitrogen species: A view from the aqueous side [DE90-013737] N92-12348
Processes for identifying regional influences of and responses to increasing atmospheric CO2 and climate change: The MINK project [DE91-018606] N92-12353
Processes for identifying regional influences of and responses to increasing atmospheric CO2 and climate change: The MINK project [DE91-018607] N92-12354

Processes for identifying regional influences of and responses to increasing atmospheric CO2 and climate change: The MINK project
[DE91-018608] N92-12355
Priority pollutant analysis of MHD-derived combustion products
[DE90-012630] N92-12689
Advanced infrared astronomy N92-12826
Outer planet studies N92-12829
Observational studies of the exospheres of the Moon and Mercury N92-12839
Io's atmosphere detected by ground-based microwave spectroscopy N92-12859
Ground based infrared measurements of the global distribution of ozone in the atmosphere of Mars N92-12875
Ethylene line emission from the North Pole of Jupiter N92-12876
Deuterium on Venus: Observations from Earth N92-12879
Fractionation of terrestrial neon by hydrodynamic hydrogen escape from ancient steam atmospheres N92-12931

ATMOSPHERIC DIFFUSION
Development of atmospheric diffusion evaluation method incorporating thermal and topographical effects. Part 2: A literature review of turbulence model under topographical condition
[DE90-503795] N92-12345

ATMOSPHERIC ENTRY
Nondestructive testing of oxidation protected carbon/carbon materials
[REPT-911-430-136] N92-12065

ATMOSPHERIC GENERAL CIRCULATION MODELS
Cloud parameterization for climate models
[DE90-014344] N92-12369
Numerical studies of the role of clouds in the present climate
[DE90-014345] N92-12370

ATMOSPHERIC MODELS
A concept for treating dense-gas dispersion under realistic conditions of terrain and variable winds
[DE90-012892] N92-12343
Development of atmospheric diffusion evaluation method incorporating thermal and topographical effects. Part 2: A literature review of turbulence model under topographical condition
[DE90-503795] N92-12345
Three-dimensional forecasting models on a desk-top computer
[DE90-010612] N92-12347
Processes for identifying regional influences of and responses to increasing atmospheric CO2 and climate change: The MINK project
[DE91-018608] N92-12355
A standard test set for numerical approximations to the shallow water equations in spherical geometry
[DE92-000385] N92-12365
Cloud parameterization for climate models
[DE90-014344] N92-12369
A study of the temporal behavior of the vertical structure of Jupiter's atmosphere N92-12976

ATMOSPHERIC PHYSICS
Chemical release and radiation effects experiment advanced planned
[NASA-CR-184229] N92-12360
Measurement of charge exchange reaction constants both at equilibrium and out of equilibrium in a Paul trap
[ETN-91-90103] N92-12361
Simulating climate with two different numerical schemes
[DE90-011777] N92-12367

ATMOSPHERIC PRESSURE
Summary of 1991 Atlantic tropical cyclone activity and seasonal forecast verification: A year .// no hurricanes in the tropics but an unusually large number of higher latitude baroclinically influenced tropical cyclone systems N92-12376

ATMOSPHERIC TEMPERATURE
An atlas of monthly mean distributions of GEOSAT sea surface height, SSMI surface wind speed, AVHRR/2 sea surface temperature, and ECMWF surface wind components during 1988
[NASA-CR-189029] N92-12385
Studies of thermal wave phenomena on the Jovian planets N92-12809
Studies of thermal wave phenomena on the Jovian planets N92-12867

ATMOSPHERIC TURBULENCE
Development of atmospheric diffusion evaluation method incorporating thermal and topographical effects. Part 2: A literature review of turbulence model under topographical condition
[DE90-503795] N92-12345
The modelling of turbulence and downbursts for flight simulators
[UTIAS-339] N92-12373

ATOMIC STRUCTURE
Optical properties of MX chain materials: An extended Peierls-Hubbard model
[DE92-000314] N92-12764

ATOMIZING
A planar-fluorescence imaging technique for studying droplet-turbulence interactions in vaporizing sprays N92-12050

AUGER EFFECT
Recent (e,2e) studies: Laser excited atoms, autoionization, Auger processes, and thin films
[DE91-634156] N92-12614

AUGER SPECTROSCOPY
Random uncertainties in the surface spectroscopies
[NPL-DMM(A)-26] N92-12087

AURORAL IRRADIATION
Generation of auroral kilometric radiation in upper hybrid wave-lower hybrid soliton interaction
[MPE-PREPRINT-202] N92-12364

AURORAL ZONES
Global scale auroral emissions on Jupiter N92-12891

AURORAS
Global scale auroral emissions on Jupiter N92-12891

AUSTENITIC STAINLESS STEELS
Evaluation of the fabricability of advanced austenitic tubing
[DE91-017158] N92-12109

AUSTIN COMET
Time-lapse CCD imagery of plasma-tail motions in Comet Austin N92-12874

AUTOIONIZATION
Recent (e,2e) studies: Laser excited atoms, autoionization, Auger processes, and thin films
[DE91-634156] N92-12614

AUTOMATA THEORY
Magnetohydrodynamic cellular automata
[NIFS-16] N92-12707

AUTOMATIC CONTROL
Ground support system methodology and architecture N92-12018
Automation for deep space vehicle monitoring N92-12022
MOD control center automated information systems security evolution N92-12030
Automating a spacecraft electrical power system using expert systems
[NASA-TP-3161] N92-12052
The variable polarity plasma arc welding process: Characteristics and performance
[NASA-CR-184259] N92-12279
Automatic programming of simulation models
[NASA-CR-184221] N92-12448
Machine Intelligence for Aerospace Electronic Systems
[AGARD-CP-499] N92-12517
Heuristic route optimization: A model for force level route planning N92-12520
Automated threat response recommendation in environments of high data uncertainty using the Countermeasure Association Technique (CMAT) N92-12525
Full surface testing of grazing incidence mirrors
[AD-A240356] N92-12676

AUTOMATIC FLIGHT CONTROL
Resonance and control response tests using a control stimulation drive
[MBB-UD-0586-90-PUB] N92-12003

AUTOMATIC PILOTS
A NASA/RAE cooperation in the development of a real-time knowledge based autopilot N92-12528

AUTOMATIC TEST EQUIPMENT
Diagnostic reasoning techniques for selective monitoring
[NASA-CR-189446] N92-12549

AUTOMATION
Interactive Office user's manual
[NASA-CR-184203] N92-12447

AUTOMOBILE FUELS
Alternative motor fuel use model: Model theory and design and user's guide
[DE90-012040] N92-12134

AUTOMORPHISMS
Concept lattices with anti-endomorphism
[ETN-91-90182] N92-12594

AUTONOMOUS NAVIGATION
Autonomous trajectory generation for mobile robots with non-holonomic and steering angle constraints
[DE90-012298] N92-12268
Adaptive tactical navigation program N92-12529

AUTONOMY
Automating a spacecraft electrical power system using expert systems
[NASA-TP-3161] N92-12052
Planning and reasoning in the JPL telerobot testbed
[NASA-CR-189038] N92-12278
A synergistic approach to reasoning for autonomous satellites N92-12522

AUTOREGRESSIVE PROCESSES
Spectral factorization of linear periodic systems with application to the optimal prediction of periodic ARMA models
[REPT-90-013] N92-12768

AVIONICS
An independent review of the Multi-Path Redundant Avionics Suite (MPRAS) architecture assessment and characterization report
[NASA-CR-188126] N92-12440
Military and civil software standards and guidelines for guidance and control N92-12452
Process/object-oriented Ada software design for an experimental helicopter N92-12461
Machine Intelligence for Aerospace Electronic Systems
[AGARD-CP-499] N92-12517
Development of tactical decision aids N92-12532
Expert system for the Tornado ground-based check-out system N92-12536
Integrated Communications, Navigation, Identification, Avionics (ICNIA) expert system for fault tolerant avionics N92-12539
A development-memory approach for enhancing avionics software logistics N92-12540
Engineering Graphical Analysis Tool (EGAT) development program N92-12542

AXES OF ROTATION
On the evolution of pulsars N92-12935

AXIAL LOADS
Determination of the effects of wind-induced vibration on cylindrical beams
[NASA-TM-103824] N92-12300

AXIAL STRAIN
Photoelastic coating method strain survey of cruciform specimen
[NRC-LTR-ST-1747] N92-12123

AXISYMMETRIC BODIES
Pitching moment derivative due to rate of pitch for projectiles at supersonic speeds
[ESDU-91004] N92-11967

AZOLES
The thermodynamic properties of benzothiazole and benzoxazole
[DE91-002250] N92-12769

B

BACKGROUND RADIATION
High-Energy Astrophysics. American and Soviet Perspectives
[NASA-CR-186558] N92-12933
The large-scale surface brightness distribution of the x ray background N92-12961

BACTERIA
Characterization of a rotating drum for long term studies of aerosols
[FOA-C-40261-4.5] N92-12399

BALLISTICS
Generalized finite element gap model
[AD-A240559] N92-12471

BALLOON FLIGHT
Results of the 1991 NASA/JPL balloon flight solar cell calibration program
[NASA-CR-188968] N92-12332

BALLOON-BORNE INSTRUMENTS
Results of the 1991 NASA/JPL balloon flight solar cell calibration program
[NASA-CR-188968] N92-12332

BAND STRUCTURE OF SOLIDS
Laser conditioning of optical thin films
[DE90-013483] N92-12672

BARIUM OXIDES
Effects of ambient background gases on YBCO plume propagation under film growth conditions: Spectroscopic, ion probe, and fast photographic studies
[DE92-000431] N92-12737
Magnetization studies of irradiation modified single crystal Y1Ba2Cu3O7 superconductors: Flux creep and annealing effects
[DE91-018858] N92-12758
Properties of epitaxial YBa2Cu3O(7-delta)-based superconducting superlattices
[DE92-000423] N92-12765
Laser ablation synthesis and properties of epitaxial YBa2Cu3O(7-delta) / PrBa2Cu3O(7-delta) superconducting superlattices
[DE92-000447] N92-12766

BARRIER LAYERS
Properties of epitaxial YBa2Cu3O(7-delta)-based superconducting superlattices
[DE92-000423] N92-12765
BARYONS
The riddle of high-energy baryon number violation
[DE92-000253] N92-12644
BASALT
Relationships among basaltic lunar meteorites
N92-12922
BAYES THEOREM
Using computer experiments to construct a cheap substitute for an expensive simulation model --- application to a compression molding process
[DE92-000421] N92-12494
Diagnostic reasoning techniques for selective monitoring
[NASA-CR-189446] N92-12549
Time-reversion of a hybrid state stochastic difference system
[NLT-TP-89014-U] N92-12585
BEADS
Advanced study in solid transport: Rheological behavior of dense suspension
[DE90-009025] N92-12196
BEAMS (RADIATION)
Physics design of the high brightness linac for the advanced free-electron laser initiative at Los Alamos
[DE92-000179] N92-12262
BEARINGS
Method of recertifying a loaded bearing member
[NASA-CASE-LAR-14168-1] N92-12302
BEND TESTS
Ductile-brittle transition temperature testing of tungsten using the three-point bend test
[DE92-000099] N92-12116
BENDING
Determination of the effects of wind-induced vibration on cylindrical beams
[NASA-TM-103824] N92-12300
BETA PARTICLES
A scintillation detector for measuring inert gas beta rays
[DE91-630700] N92-12634
Direct measurements of neutrino mass
[DE92-000168] N92-12638
BETATRONS
First order tune shift calculations for transverse betatron dynamics
[DE92-000370] N92-12668
BIBLIOGRAPHIES
Aerospace medicine and biology: A continuing bibliography with indexes (supplement 354)
[NASA-SP-7011(354)] N92-12404
Aerospace medicine and biology: A continuing bibliography with indexes (supplement 355)
[NASA-SP-7011(355)] N92-12412
Bibliography for computer security, integrity, and safety
[NASA-CR-188950] N92-12439
Bibliography of Lewis Research Center technical publications announced in 1990
[NASA-TM-103753] N92-12786
BIG BANG COSMOLOGY
Can a man-made universe be achieved by quantum tunneling without an initial singularity? N92-12951
BILLETS
Spatial variability in the tensile strength of an extruded nuclear-grade graphite
[DE91-018868] N92-12070
BINARY ALLOYS
Ageing characteristics of dendritic and non-dendritic (stir-cast) Zn-Al alloy (ZA-27)
[NRC-28906] N92-12107
BINARY STARS
A three-dimensional model for molecular cloud collapse and protostellar formation N92-12898
The evolution of the gravitational radiation from stellar components of galaxies N92-12959
Close binary stars in globular clusters N92-12960
Gas flow and generation of x ray emission in WR+OB binaries N92-12972
BIOASTRONAUTICS
Aerospace medicine and biology: A continuing bibliography with indexes (supplement 354)
[NASA-SP-7011(354)] N92-12404
Aerospace medicine and biology: A continuing bibliography with indexes (supplement 355)
[NASA-SP-7011(355)] N92-12412
BIOCHEMISTRY
Computer aided modelization of ribosomic data
[ETN-91-90161] N92-12391
BIOCONVERSION
Division of Energy Biosciences: Summaries of FY 1991 activities
[DE92-000518] N92-12401
BIODEGRADATION
Division of Energy Biosciences: Summaries of FY 1991 activities
[DE92-000518] N92-12401
BIOGEOCHEMISTRY
Concluding remarks: Promises and limitations of individual cell and particle analysis
[DE91-016900] N92-12381
BIOLOGICAL EFFECTS
Immunological and biochemical effects of 60 Hz electric and magnetic fields in humans
[DE90-012546] N92-12402
Immunological and biochemical effects of 60 Hz electric and magnetic fields in humans
[DE90-012547] N92-12403
Aerospace medicine and biology: A continuing bibliography with indexes (supplement 354)
[NASA-SP-7011(354)] N92-12404
When is a dose not a dose?
[DE92-000132] N92-12409
History of the determination of radium in man since 1915
[DE92-000355] N92-12410
Aerospace medicine and biology: A continuing bibliography with indexes (supplement 355)
[NASA-SP-7011(355)] N92-12412
BIOMASS
Rangeland-plant response to elevated CO2
[DE90-013702] N92-12387
Division of Energy Biosciences: Summaries of FY 1991 activities
[DE92-000518] N92-12401
BIOMASS ENERGY PRODUCTION
A summary of the status of biomass conversion technologies and opportunities for their use in Latin America
[DE90-012284] N92-12328
BIOSPHERE
Estimation of surface heat and moisture fluxes over a prairie grassland using a hybrid biosphere/remote sensing model N92-12320
BIREFRINGENCE
Analysis of cladded uniaxial single crystal fibers
[NRC-32596] N92-12678
BISMUTH COMPOUNDS
Evidence of weak pair coupling in the penetration depth of bi-based high-Tc superconductors
[DE90-009415] N92-12741
BL LACERTAE OBJECTS
Extragalactic x ray source counts N92-12967
BLACK BODY RADIATION
Error analysis by numerical simulation for a three-color pyrometer assuming a blackbody spectrum and a wavelength and temperature dependent emissivity
[DE90-011504] N92-12230
BLACK HOLES (ASTRONOMY)
The PSR 2127+12 as an indicator of a massive blac k hole in the core of globular cluster M 15 N92-12964
BLAST LOADS
The effect of berming on the response of structures subjected to nearby detonations
[FFI-91/4005] N92-12310
BLOOD VESSELS
Three dimensional reconstruction of vascular networks in trinocular vision
[TELECOM-PARIS-90-E-022] N92-12406
BODY-WING CONFIGURATIONS
Lift-curve slope of wing-body combinations
[ESDU-91007] N92-11968
BOILING
Incipient boiling in microgravity N92-12140
BOLTZMANN TRANSPORT EQUATION
Energy models for one-carrier transport in semiconductor devices
[NASA-CR-189046] N92-12557
Derivation of the high field semiconductor equations
[DE92-000249] N92-12763
BOMBER AIRCRAFT
A threat management system N92-12535
BONDING
A process for preparing an assembly of an article and a soluble polyimide which resists dimensional change, delamination, and debonding when exposed to changes in temperature
[NASA-CASE-LAR-14763-1] N92-12121
ACLICO: An aid system for designing bonded joints
[REPT-911-430-134] N92-12146
Charge states of donor-hydrogen pairs in Si: A fragile balance
[DE91-018794] N92-12757
BONE MARROW
Cosmos-1989 immunology studies
[NASA-CR-188970] N92-12389
BOOLEAN ALGEBRA
Diagnostic reasoning techniques for selective monitoring
[NASA-CR-189446] N92-12549
BOOSTER ROCKET ENGINES
The design and performance estimates for the propulsion module for the booster of a TSTO vehicle
[NASA-TM-105299] N92-11995
BORON
A system to deposit boron films (boronization) in the D3-D tokamak
[DE92-000288] N92-12733
BORON NITRIDES
Atomic oxygen interaction with spacecraft materials: Relationship between orbital and ground-based testing for materials certification
[NASA-TM-105449] N92-12046
BOSONS
Topics in gauge theories and the unification of elementary particle interactions
[DE90-013435] N92-12603
Few-body collisions in a weakly interacting Bose gas
[ETN-91-90307] N92-12621
Trapping of neutral atoms with resonant microwave radiation N92-12623
Decay of spin-polarized atomic hydrogen in the presence of a Bose condensate N92-12624
Identifying the origin of new gauge bosons at the SSC and LHC
[DE92-000290] N92-12648
BOUNDARIES
The stability of numerical boundary treatments for compact high-order finite-difference schemes
[NASA-CR-187628] N92-12556
Magnetic field structure near the plasma boundary in helical systems and divertor tokamaks
[NIFS-17] N92-12708
BOUNDARY LAYER FLOW
Wind tunnel tests on A4, A4.1, and A4.2 2-D airfoil models in the IAR 5-ft. wind tunnel: Boeing Commercial Airplane Company and Institute for Aerospace Research collaborative work program
[NRC-IAR-C3] N92-11975
The BCAC/IAR collaborative research program to investigate the sidewall boundary layer effects in the IAR/NRC 2-D High Reynolds Number Test Facility
[NRC-HSA-434] N92-11976
BOUNDARY LAYER SEPARATION
Boundary layer transition
[CERT-RTS-55/5018-45] N92-12210
BOUNDARY LAYER STABILITY
Boundary layer transition
[CERT-RTS-55/5018-45] N92-12210
BOUNDARY LAYER TRANSITION
Control aspects of the transition from transversal to transonic flow, step effects
[ETN-91-90106] N92-11981
Boundary layer transition
[CERT-RTS-55/5018-45] N92-12210
Study of a technique of low level turbulence detection
[ETN-91-90107] N92-12215
BOUNDARY VALUE PROBLEMS
Air-breathing hypersonic vehicle guidance and control studies; An integrated trajectory/control analysis methodology: Phase 1
[NASA-CR-187623] N92-12002
Time stepping procedures for the nonstationary Stokes equations
[PREPRINT-1353] N92-12217
The stability of numerical boundary treatments for compact high-order finite-difference schemes
[NASA-CR-187628] N92-12556
Fredholm's alternative for impedance boundary value problems in acoustics
[FFA-TN-1990-46] N92-12600
BREADBOARD MODELS
Automating a spacecraft electrical power system using expert systems
[NASA-TP-3161] N92-12052
BRECCIA
Mineralogy of an unusual Cr-rich inclusion in the Los Martinez (L6) chrondritic breccia N92-12909
BRIGHTNESS
Physics design of the high brightness linac for the advanced free-electron laser initiative at Los Alamos
[DE92-000179] N92-12262
Planetary astronomy N92-12863
Outburst of Comet Halley at 14.3 AU N92-12881
BRIGHTNESS DISTRIBUTION
On the origin of the diffuse x ray background N92-12952
The large-scale surface brightness distribution of the x ray background N92-12961
BRILLOUIN EFFECT
Neutron Brillouin scattering in a metallic glass
[DE92-000219] N92-12642

BRILLOUIN ZONES
Neutron Brillouin scattering in a metallic glass
[DE92-000219] N92-12642
BRINES
Particle measurement and brine chemistry at the Salton Sea Deep Well
[DE92-000031] N92-12337
BRITTLE MATERIALS
Structures and fracture mechanic of brittle matrix composites
[REPT-911-430-131] N92-12064
BRITTLENESS
Ductile-brittle transition temperature testing of tungsten using the three-point bend test
[DE92-000099] N92-12116
BROKEN SYMMETRY
Local states in one-dimensional CDW (Charge Density Wave) materials: Spectral signatures for polarons and bipolarons in MX chains
[DE90-013150] N92-12605
BROMIDES
Measurements of heat and mass transfer coefficients during absorption of water vapor by lithium bromide and (Li,K,Na)NO3 mixtures
[DE91-014212] N92-12088
BRORSEN-METCALF COMET
Observations of formaldehyde and search for cyanoacetylene in Comet Brorsen-Metcalf (1988o)
N92-12887
BROWN DWARF STARS
The companion object to HD114762 N92-12865
BRUSHES
The stability of graphite brushes at high velocity
[ETN-91-90176] N92-12184
BUBBLE CHAMBERS
Research program in experimental high energy physics, task B
[DE90-013323] N92-12660
BUBBLES
Heat transfer between stratified liquids with bubbling across the interface
[DE90-008579] N92-12192
Prospects in extended inflation N92-12900
BUFFERS
Design of a long isotropic buffer rod
[NRC-28903] N92-12290
BUILDINGS
Air movement, comfort and ventilation in workstations
[DE92-000667] N92-12424
BUOYANCY
Combined buoyancy-thermocapillary convection
[NASA-CR-187417] N92-12207
BUOYS
Autonomous ocean profiler
[AD-A239800] N92-12383
BURGER EQUATION
Parallel solution of the Burgers equation
[CWI-NM-R9104] N92-12568
BURNING RATE
The 27th JANNAF Combustion Subcommittee Meeting, Volume 1
[CPIA-PUBL-557-VOL-1] N92-12048
BUTT JOINTS
On the formation of a joint during cold welding
[DE91-017672] N92-12275

C

C-135 AIRCRAFT
Materials processing in low gravity
[NASA-CR-184213] N92-12139
Modifications to the rapid melt/rapid quench and transparent polymer video furnaces for the KC-135
[NASA-CR-184215] N92-12231
CADMIUM TELLURIDES
An analysis of thermosolutal convection during the crystal growth of CdTe from Te solution by the THM
[REPT-911-430-135] N92-12755
CALCIUM COMPOUNDS
Carbonate and sulfate minerals in the Chassigny meteorite N92-12930
CALCIUM ISOTOPES
Examination of excitation and decay of giant resonances in Ca-40 by (e,e'x) coincidence experiments
[ETN-91-90174] N92-12617
CALIBRATING
Study of interactions on anemoclinometric sensors
[REPT-90/30] N92-12006
A numerically-stable algorithm for calibrating single six-ports for national microwave reflectometry
[NPL-DES-102] N92-12158
Thermal effects on the Josephson series-array voltage standard
[DE90-008738] N92-12160
Calibration of an FTI Omnitrak ballistic flow calibrator system
[NRC-29847] N92-12233
Sandia severe electrostatic discharge tester: Version 3 (SSET), serial number 1
[DE91-018582] N92-12243
A system for calibrating the wrist-mounted laser range finder
[NRC-29799] N92-12252
Results of the 1991 NASA/JPL balloon flight solar cell calibration program
[NASA-CR-188968] N92-12332
CALIFORNIUM ISOTOPES
Detection system characteristics using Cf-252 ionization chambers
[DE90-011702] N92-12610
Kinematic measurement of alpha particles accompanied by spontaneous fission of Cf-252
[ETN-91-90175] N92-12618
CAMERAS
Geologic mapping of tunnels using photogrammetry-control-point configuration
[DE91-019071] N92-12323
AI for RPVs, Sensor Driven Airborne Replanner (SDAR), for a Robotic Aircraft Sensor Platform (RASP)
N92-12534
Operation of the University of Hawaii 2.2M telescope on Mauna Kea N92-12814
CANADA
Flight Research Laboratory T-33 microgravity facility flight operations, 1986 to 1990
[NRC-32136] N92-12142
CANCER
Monitoring IACP samples and construction of a centralized database
[PB91-213546] N92-12351
CANONICAL FORMS
Spectral factorization of linear periodic systems with application to the optimal prediction of periodic ARMA models
[REPT-90-013] N92-12768
CANOPIES (VEGETATION)
Can sulfate fluxes in forest canopy throughfall be used to estimate atmospheric sulfur deposition?
[DE92-000044] N92-12356
CANTILEVER BEAMS
An experimental and numerical study of delamination propagation and arrest in composite beams and plates when subjected to low-velocity impact N92-12299
CAPACITANCE
Compact modeling of the dynamic behaviour of MOSFETs
[ISBN-90-9004212-1] N92-12176
The behavior and testing implications of CMOS IC logic gate open circuits
[DE91-018679] N92-12189
CAPE KENNEDY LAUNCH COMPLEX
Kennedy Space Center Launch Processing System (LPS) and the Test Checkout and Monitoring System 2 (TCMS2) N92-12013
Atmospheric environment for Space Shuttle (STS-37) launch
[NASA-TM-103556] N92-12375
CAPILLARY FLOW
Combined buoyancy-thermocapillary convection
[NASA-CR-187417] N92-12207
Periodically structured multiphase flows and hydrodynamic instabilities in narrow capillaries
[DE91-018802] N92-12223
CARBIDES
Metallacumulenes and carbide complexes
[DE90-011324] N92-12073
The EDM surface: Topography, chemistry, and metallurgy
[DE91-017756] N92-12110
CARBON CYCLE
Climate Monitoring and Diagnostics Laboratory no. 18
[PB91-205559] N92-12371
CARBON DIOXIDE
Analysis of minerals containing dissolved traces of the fluid phase components water and carbon dioxide
[NASA-CR-188993] N92-12083
The greenhouse effect and acid rain
[DE90-008347] N92-12340
Processes for identifying regional influences of and responses to increasing atmospheric CO2 and climate change: The MINK project
[DE91-018606] N92-12353
Processes for identifying regional influences of and responses to increasing atmospheric CO2 and climate change: The MINK project
[DE91-018607] N92-12354
Processes for identifying regional influences of and responses to increasing atmospheric CO2 and climate change: The MINK project
[DE91-018608] N92-12355
Rangeland-plant response to elevated CO2
[DE90-013702] N92-12387
Properties of liquid water and carbon dioxide from constant pressure-constant temperature molecular dynamics
[DE91-018219] N92-12633
Outburst of Comet Halley at 14.3 AU N92-12881
CARBON DIOXIDE CONCENTRATION
Report of a workshop on using remote sensing to estimate land use change
[DE90-011278] N92-12318
The potential impact of conservation and alternative energy sources on carbon dioxide emissions
[DE90-008346] N92-12339
CARBON FIBER REINFORCED PLASTICS
Improved specimen support jig for hot-wet compression testing
[NRC-LTR-ST-1790] N92-12059
Physicochemical characterization of high-performance fibre-reinforced organic-matrix composites. Part 6: Methods for quality control of matrix chemistry
[NRC-28667-PT-6] N92-12061
CARBON FIBERS
Influences of expanding monomer on carbon fiber reinforced epoxy composites 2
[AD-A240583] N92-12057
CARBON ISOTOPES
Carbon and oxygen isotope composition of carbonates from an L6 chondrite: Evidence for terrestrial weathering from the Holbrook meteorite N92-12928
CARBON MONOXIDE
Metallacumulenes and carbide complexes
[DE90-011324] N92-12073
Processes for identifying regional influences of and responses to increasing atmospheric CO2 and climate change: The MINK project
[DE91-018606] N92-12353
Processes for identifying regional influences of and responses to increasing atmospheric CO2 and climate change: The MINK project
[DE91-018607] N92-12354
Processes for identifying regional influences of and responses to increasing atmospheric CO2 and climate change: The MINK project
[DE91-018608] N92-12355
Outburst of Comet Halley at 14.3 AU N92-12881
CARBON STEELS
Environmental projects. Volume 13: Underground storage tanks, removal and replacement. Goldstone Deep Space Communications Complex
[NASA-CR-189030] N92-12035
CARBON-CARBON COMPOSITES
Structures and fracture mechanic of brittle matrix composites
[REPT-911-430-131] N92-12064
Nondestructive testing of oxidation protected carbon/carbon materials
[REPT-911-430-136] N92-12065
CARBONACEOUS CHONDRITES
Aqueous alteration on the parent bodies of carbonaceous chondrites: Computer simulations of late-stage oxidation N92-12908
Transmission electron microscopy of an interplanetary dust particle with links to CI chondrites N92-12919
Evaluation of the Strecker synthesis as a source of amino acids on carbonaceous chondrites N92-12920
Mineralogy and matrix composition of CR chondrites Renazzo and EET 87770, and ungrouped chondrites Essebi and MAC 87300 N92-12932
CARBONACEOUS METEORITES
Interstellar organics and possible connections with the carbonaceous components of meteorites and IDPs
N92-12902
CARBONATES
Carbon and oxygen isotope composition of carbonates from an L6 chondrite: Evidence for terrestrial weathering from the Holbrook meteorite N92-12928
Carbonate and sulfate minerals in the Chassigny meteorite N92-12930
CARCINOGENS
Monitoring IACP samples and construction of a centralized database
[PB91-213546] N92-12351
When is a dose not a dose?
[DE92-000132] N92-12409
CARDIOGRAPHY
Cardiac magnetic resonance imaging by retrospective gating: Mathematical modelling and reconstruction algorithms
[CWI-AM-R9024] N92-12408
CARRIER FREQUENCIES
Joint carrier phase estimation and symbols decoding of trellis codes
[TELECOM-PARIS-91-C-003] N92-12473

CARRIER MOBILITY
Thermal generation and mobility of charge carriers in collective proton transport in hydrogen-bonded chains [DE92-000306] N92-12649
CASE HISTORIES
Ejection systems and the human factor: A guide for flight surgeons and aeromedical trainers [DCIEM-88-TR-16] N92-11986
CASSEGRAIN OPTICS
Imaging studies of comets N92-12836
CASSINI MISSION
Probing Titan's atmosphere with a stellar occultation N92-12871
CAST ALLOYS
The effect of casting temperature on the fatigue properties of cast nickel aluminide alloys [DE92-000432] N92-12118
CASTING
Ageing characteristics of dendritic and non-dendritic (stir-cast) Zn-Al alloy (ZA-27) [NRC-28906] N92-12107
The effect of casting temperature on the fatigue properties of cast nickel aluminide alloys [DE92-000432] N92-12118
CATACLYSMIC VARIABLES
Cataclysmic variables in globular clusters and low mass x ray binaries N92-12897
Ar-39-Ar-40 of achondrites: Evidence for a lunar-like cataclysm N92-12907
CATALYSIS
Reduced molybdenum oxidation states in hydrodesulfurization catalysis by Chevrel phases [DE91-018168] N92-12092
Catalysis and biocatalysis program [NASA-CR-189452] N92-12392
CATALYSTS
Probe molecule studies: Active species in alcohol synthesis [DE92-000332] N92-12138
CATALYTIC ACTIVITY
Current issues in sol-gel reaction kinetics [DE90-012226] N92-12074
Control of catalytic hydrotreating selectivity with ammonia [DE91-018084] N92-12091
Catalysis and biocatalysis program [NASA-CR-189452] N92-12392
CATASTROPHE THEORY
Modal interaction in linear dynamic systems near degenerate modes [NASA-TM-105315] N92-12316
CATHODES
Molten carbonate fuel cell research [DE90-013896] N92-12120
New technology for linear colliders [DE92-000081] N92-12664
CATHODOLUMINESCENCE
Low temperature annealing and cathodoluminescence studies of type 1 chondrule compositions N92-12913
CAUCHY PROBLEM
Efficient multi-dimensional upwinding for the steady Euler equations [CWI-NM-R9107] N92-12570
CAVITY RESONATORS
An astigmatic unstable resonator with an intracavity deformable mirror [DE91-018815] N92-12257
CELLS (BIOLOGY)
Concluding remarks: Promises and limitations of individual cell and particle analysis [DE91-016900] N92-12381
Computer aided modelization of ribosomic data [ETN-91-90161] N92-12391
CELLULOSE NITRATE
Shock characterization of nitrocellulose-based gun propellant [DE91-019057] N92-12137
CENSORED DATA (MATHEMATICS)
Two nonparametric estimators of the survival function of bivariate right censored observations [CWI-BS-R9035] N92-12583
CENTAUR LAUNCH VEHICLE
Centaur in-tank explosion flow fields within STS and Titan 4 payload spaces [NASA-CR-189039] N92-12144
CENTER OF GRAVITY
Radial velocity detection of extra-solar planetary systems N92-12806
CENTRAL AMERICA
A summary of the status of biomass conversion technologies and opportunities for their use in Latin America [DE90-012284] N92-12328
CENTRAL PROCESSING UNITS
Huntsville Operations Support Center N92-12024
Solving stochastic linear programs on a hypercube multicomputer [AD-A240630] N92-12472
CERAMIC FIBERS
Interface effects and fracture in Nicalon/SiC composites [DE90-012925] N92-12055
High-temperature corrosion of Nicalon(tm)/SiC composites [DE92-000281] N92-12071
CERAMIC MATRIX COMPOSITES
Interface effects and fracture in Nicalon/SiC composites [DE90-012925] N92-12055
Structures and fracture mechanic of brittle matrix composites [REPT-911-430-131] N92-12064
CERAMICS
Current programmes of Metallurgy Division, 1991 [DE91-634904] N92-12104
Vickers microindentation toughness of a sintered SiC in the median-crack regime [DE92-000225] N92-12132
Material and lubricant relationships in the tribology of internal combustion engines [DE92-000674] N92-12284
Fabrication and assembly of BOLVAPS (boil-off lithium vapor source) ceramic-option half anodes [DE90-012012] N92-12661
Recent progress in the development of materials for fusion reactors [DE91-016283] N92-12722
CESIUM ISOTOPES
Cs-135 - Ba-135: A new cosmochronometric constraint on the origin of the Earth and the astrophysical site of the origin of the solar system N92-12915
CHAOS
Chaotic inflationary universe and the anisotropy of the large-scale structure N92-12943
CHARACTER RECOGNITION
Some methods of encoding simple visual images for use with a sparse distributed memory, with applications to character recognition [NASA-CR-188848] N92-12436
CHARACTERIZATION
A wall stabilized arc as a light source for spectroscopic techniques [ETN-91-90308] N92-12715
CHARGE CARRIERS
Thermal generation and mobility of charge carriers in collective proton transport in hydrogen-bonded chains [DE92-000306] N92-12649
CHARGE COUPLED DEVICES
Fast Optically Sensitive Segmented Array (FOSSA) [DE91-018997] N92-12684
Planetary Spectroscopy N92-12811
Surveying of the solar system N92-12813
Operation of the University of Hawaii 2.2M telescope on Mauna Kea N92-12814
Imaging studies of comets N92-12836
Planetary optical and infrared imaging N92-12849
Compositional studies of primitive asteroids N92-12853
Physical studies of small asteroids and cometary nuclei N92-12855
Discovery of near-Earth asteroids by CCD scanning N92-12868
Time-lapse CCD imagery of plasma-tail motions in Comet Austin N92-12874
Storm on Saturn N92-12877
CHARGE DISTRIBUTION
Mobile charge and electric field distributions in abrupt PN junctions: An approach with the state variable method [REPT-90-051] N92-12188
Local states in one-dimensional CDW (Charge Density Wave) materials: Spectral signatures for polarons and bipolarons in MX chains [DE90-013150] N92-12605
CHARGE EXCHANGE
Measurement of charge exchange reaction constants both at equilibrium and out of equilibrium in a Paul trap [ETN-91-90103] N92-12361
Nuclear structure theory [DE90-013949] N92-12609
CHARGE FLOW DEVICES
Design, manufacture, and calibration of Foucault current sensors [DCR/M-51739/F-90] N92-12235
CHARGED PARTICLES
Charge states of donor-hydrogen pairs in Si: A fragile balance [DE91-018794] N92-12757
Laboratory simulation of the surface of Halley's Comet N92-12872
CHARON
Photometry of Pluto-Charon mutual events and Hirayama family asteroids N92-12799
Visual and infrared studies of asteroids and the Pluto-Charon system N92-12848
Studies of Triton and the Pluto-Charon system N92-12850
The year 1990 marks end of Pluto-Charon mutual event season N92-12889
CHARTS
An atlas of monthly mean distributions of GEOSAT sea surface height, SSMI surface wind speed, AVHRR/2 sea surface temperature, and ECMWF surface wind components during 1988 [NASA-CR-189029] N92-12385
CHASSIGNITES
Nd-142/Nd-144 in SNCs and early differentiation of a heterogeneous Martian mantle N92-12925
CHECKOUT
Kennedy Space Center Launch Processing System (LPS) and the Test Checkout and Monitoring System 2 (TCMS2) N92-12013
Expert system for the Tornado ground-based check-out system N92-12536
Using AITEST to troubleshoot a Radar Modulator (RM) unit: A case study in the application of expert systems to intermediate-level testing N92-12537
CHEMICAL ANALYSIS
Microsensor research [DE90-011801] N92-12227
Pulsed laser fluorometry for environmental monitoring [DE90-013163] N92-12249
Extraterrestrial water of possible Martian origin in SNC meteorites: Constraints from oxygen isotopes N92-12917
Iddingsite in the Nakhla meteorite: TEM study of mineralogy and texture of pre-terrestrial (Martian?) alterations N92-12929
CHEMICAL COMPOSITION
Physicochemical characterization of high-performance fibre-reinforced organic-matrix composites. Part 6: Methods for quality control of matrix chemistry [NRC-28667-PT-6] N92-12061
Modelling the cure of Narmco 5208: A method for determining the chemical state of the prepreg [NRC-29449] N92-12126
Radar interferometric studies of comets N92-12845
Spatially resolved quantitative spectroscopy of comets N92-12846
Physical observations of comets: Their composition, origin and evolution N92-12864
Radiative transfer in planetary atmospheres: Submillimeter-wave spectroscopy of comets N92-12885
Tentative identification of a newly discovered class of material on Io N92-12892
Compositional studies of primitive asteroids N92-12893
Astrometric observations of comets and minor planets N92-12894
Clathrate type 2 hydrate formation in vacuo under astrophysical conditions N92-12906
Mineralogy of an unusual Cr-rich inclusion in the Los Martinez (L6) chrondritic breccia N92-12909
Distribution of silicon between kamacite and taenite N92-12911
The origin of amorphous rims on lunar plagioclase grains: Solar wind damage or vapor condensates N92-12918
Transmission electron microscopy of an interplanetary dust particle with links to CI chondrites N92-12919
Evaluation of the Strecker synthesis as a source of amino acids on carbonaceous chondrites N92-12920
CHEMICAL ELEMENTS
Chemical release and radiation effects experiment advanced planned [NASA-CR-184229] N92-12360
CHEMICAL ENERGY
Chemical potential from integral equations using scaled particle theory [DE90-011277] N92-12075
CHEMICAL EXPLOSIONS
Hypervelocity explosive launchers [DE90-011713] N92-12036
High explosives skid impact initiation study [DE90-011266] N92-12133
Research needs for improvement of protection against explosive or toxic industrial chemicals hazards [FOA-C-40286-4.5] N92-12147
Development of a non-propagating explosives storage cabinet [DE91-017923] N92-12148
CHEMICAL FUELS
Catalysis and biocatalysis program [NASA-CR-189452] N92-12392

CHEMICAL PROPERTIES
Orientation dependency of structural and chemical properties of Si(001) vicinal surfaces
[ETN-91-90154] N92-12754
CHEMICAL REACTIONS
Implementation of a modified Johnson and Hindmarsh mass and energy model
[DE90-000488] N92-12329
CHEMICAL RELEASE MODULES
Combined Release and Radiation Effects Satellite (CRRES) Experiment: Educational planning and coordination
[NASA-CR-184255] N92-12362
CHEMISORPTION
Reduced molybdenum oxidation states in hydrodesulfurization catalysis by Chevrel phases
[DE91-018168] N92-12092
CHINA
The estimation of the dose from cosmic radiation received by the population living at mainland of China
[DE91-631668] N92-12985
CHIPS (ELECTRONICS)
Code generation for fast DSP-based real-time control N92-12462
Real-time VLSI architecture for geometric image transformations N92-12490
CHIRON
Observational evidence of aging processes in comets N92-12833
Detection of CN emission from (2060) Chiron N92-12860
Visual and near-IR spectrophotometry of asteroids N92-12878
CHOLINESTERASE
Pulsed laser fluorometry for environmental monitoring
[DE90-013163] N92-12249
CHONDRITES
Mineralogy of an unusual Cr-rich inclusion in the Los Martinez (L6) chrondritic breccia N92-12909
Cosmogenic Ar-36 from neutron capture by Cl-35 in the Chico L6 chondrite: Additional evidence for large shielding N92-12914
Dynamic crystallization characteristics of enstatite chondrite chondrules N92-12923
Carbon and oxygen isotope composition of carbonates from an L6 chondrite: Evidence for terrestrial weathering from the Holbrook meteorite N92-12928
CHONDRULE
Low temperature annealing and cathodoluminescence studies of type 1 chondrule compositions N92-12913
Dynamic crystallization characteristics of enstatite chondrite chondrules N92-12923
CHROMATOGRAPHY
Quick separation and determination of Pm-147 in water by HDEHP-KeL-F chromatography
[DE91-628873] N92-12094
Single-column ion chromatography of passive monitors for atmospheric pollution
[NRC-28893] N92-12352
CHROMIUM STEELS
Strength evaluation for modified 12Cr steel and A286 steel of USC turbine rotor materials
[DE90-503033] N92-12099
Corrosion under stress of AISI 304 steel in thiocyanate solutions
[DE91-631523] N92-12115
A method for multiaxial fatigue life prediction using energy approaches
[DE91-018851] N92-12315
CHROMOSOMES
Chromogenic identification of promoters in Streptomyces lividans by using an ampC beta-lactamase promoter-probe vector N92-12398
CHROMOSPHERE
The formation, structure and dissipation of direct electric current systems in the solar atmosphere N92-12979
CHRONOLOGY
Storm calendar 1964-1990: Chronological survey of all storms (wind force 8 and higher) along the Dutch coast in the period 1964-1990
[KNMI-176] N92-12374
CHRONOPHOTOGRAPHY
Time-lapse CCD imagery of plasma-tail motions in Comet Austin N92-12874
CIRCLES (GEOMETRY)
Consistency conditions and representations of a q-deformed Virasoro algebra
[DE90-013715] N92-12359
CIRCUIT DIAGRAMS
V.DMOS transistor modeling for simulation of power electronic circuits
[LAAS-91711] N92-12179
CIRCUIT RELIABILITY
V.DMOS transistor modeling for simulation of power electronic circuits
[LAAS-91711] N92-12179
Diagnostic reasoning techniques for selective monitoring
[NASA-CR-189446] N92-12549
CIRCUITS
Gold sulfide replacements of cyanide solutions
[DE91-017981] N92-12111
Computation of magnetic suspension of maglev systems using dynamic circuit theory
[DE91-017973] N92-12280
Diagnostic reasoning techniques for selective monitoring
[NASA-CR-189446] N92-12549
CIVIL AVIATION
Military and civil software standards and guidelines for guidance and control N92-12452
CL-41 AIRCRAFT
Tutor aft fuselage and empennage full-scale fatigue test: Resolution of horizontal stabilizer installation difficulties
[NRC-LTR-ST-1804] N92-11990
CLARITY
Perceived sharpness in static and moving images
[ETN-91-90138] N92-12413
CLASSIFICATIONS
An empirical investigation of sparse distributed memory using discrete speech recognition
[NASA-CR-187893] N92-12437
CLASSIFIERS
Machine learning: An approach based on classifier systems and evolutionary algorithms
[REPT-90-043] N92-12550
CLATHRATES
Clathrate type 2 hydrate formation in vacuo under astrophysical conditions N92-12906
CLAYS
Iddingsite in the Nakhla meteorite: TEM study of mineralogy and texture of pre-terrestrial (Martian?) alterations N92-12929
CLIMATE
Processes for identifying regional influences of and responses to increasing atmospheric CO2 and climate change: The MINK project
[DE91-018606] N92-12353
Processes for identifying regional influences of and responses to increasing atmospheric CO2 and climate change: The MINK project
[DE91-018607] N92-12354
Processes for identifying regional influences of and responses to increasing atmospheric CO2 and climate change: The MINK project
[DE91-018608] N92-12355
Simulating climate with two different numerical schemes
[DE90-011777] N92-12367
Numerical studies of the role of clouds in the present climate
[DE90-014345] N92-12370
Climate Monitoring and Diagnostics Laboratory no. 18
[PB91-205559] N92-12371
CLIMATE CHANGE
Global climate change and human health: Information needs, research priorities, and strategic considerations
[DE90-012599] N92-12342
Managing global climate change through international cooperation: Lessons from prior resource management efforts
[DE90-014699] N92-12350
Processes for identifying regional influences of and responses to increasing atmospheric CO2 and climate change: The MINK project
[DE91-018606] N92-12353
Processes for identifying regional influences of and responses to increasing atmospheric CO2 and climate change: The MINK project
[DE91-018607] N92-12354
Processes for identifying regional influences of and responses to increasing atmospheric CO2 and climate change: The MINK project
[DE91-018608] N92-12355
Contents of the JPL Distributed Active Archive Center (DAAC) archive, version 2-91
[NASA-CR-189027] N92-12784
CLIMATOLOGY
Interpreting measurements obtained with the cloud absorption radiometer
[NASA-CR-189241] N92-12366
CLOCKS
Coprocessor support for real-time Ada N92-12454
CLOSED ECOLOGICAL SYSTEMS
Life sciences report 1987
[NASA-TM-105105] N92-12388
CLOSTRIDIUM
An evaluation of the potential of combination processes involving heat and irradiation for food preservation
[DE91-638734] N92-12423
CLOUD PHYSICS
Interpreting measurements obtained with the cloud absorption radiometer
[NASA-CR-189241] N92-12366
Numerical studies of the role of clouds in the present climate
[DE90-014345] N92-12370
CLOUDS
Ground-based millimeter wave Cloud Profiling Radar System (CPRS)
[DE91-018373] N92-12159
CLOUDS (METEOROLOGY)
Cloud parameterization for climate models
[DE90-014344] N92-12369
Numerical studies of the role of clouds in the present climate
[DE90-014345] N92-12370
CMOS
The behavior and testing implications of CMOS IC logic gate open circuits
[DE91-018679] N92-12189
Integrated, non-volatile, high-speed analog random access memory
[NASA-CASE-NPO-17998-1-CU] N92-12438
CN EMISSION
Detection of CN emission from (2060) Chiron N92-12860
Detection of solid C(triple bond)N bearing materials on solar system bodies N92-12866
COATINGS
Interface effects and fracture in Nicalon/SiC composites
[DE90-012925] N92-12055
Controlled microstructure oxide coating for chemical sensors
[DE90-012223] N92-12119
Photoelastic coating method strain survey of cruciform specimen
[NRC-LTR-ST-1747] N92-12123
A system to deposit boron films (boronization) in the D3-D tokamak
[DE92-000288] N92-12733
COAXIAL CABLES
High power impedance matchers with 100-ps risetime
[DE90-013516] N92-12150
COBALT ISOTOPES
X ray radiation from Supernova 1987A. The results of the Kvant module in 1987-1989 N92-12970
CODING
MERIS data compression: A presentation of the current status of the study
[REPT-911-440-113] N92-12322
The effect of on/off indicator design on state confusion, preference, and response time performance, executive summary
[NASA-CR-185662] N92-12416
Some methods of encoding simple visual images for use with a sparse distributed memory, with applications to character recognition
[NASA-CR-188848] N92-12436
COEFFICIENTS
Measurements of heat and mass transfer coefficients during absorption of water vapor by lithium bromide and (Li,K,Na)NO3 mixtures
[DE91-014212] N92-12088
COGNITION
Information and information processing N92-12779
COHERENT RADIATION
Method and apparatus for producing a photopumped VUV laser in Mo(6+) ion-containing plasma
[AD-D014961] N92-12250
COINCIDENCE CIRCUITS
Examination of excitation and decay of giant resonances in Ca-40 by (e,e'x) coincidence experiments
[ETN-91-90174] N92-12617
COLD ROLLING
The effect of working process on hydrogenate orientation of Zr-4 alloy tube
[DE91-629474] N92-12114
COLD WELDING
On the formation of a joint during cold welding
[DE91-017672] N92-12275
COLLISION AVOIDANCE
Autonomous trajectory generation for mobile robots with non-holonomic and steering angle constraints
[DE90-012298] N92-12268
COLLISION PARAMETERS
Recent (e,2e) studies: Laser excited atoms, autoionization, Auger processes, and thin films
[DE91-634156] N92-12614
COLLISIONAL PLASMAS
Stochastic and collisional diffusion in two-dimensional periodic flows
[DE90-014335] N92-12198

COLOR
Potential of tuneable lasers for optimised dual-colour laser ranging
[REPT-911-440-111] N92-12255
The effect of on/off indicator design on state confusion, preference, and response time performance, executive summary
[NASA-CR-185662] N92-12416
COLORIMETRY
Visible and infrared investigations of planet-crossing asteroids and outer solar system objects N92-12851
COLUMBUS SPACE STATION
Launch site operations for Columbus Free Flyer and resupply missiog
[MBB-UO-0153-91-PUB] N92-12034
MTFF operations
[MBB-UO-0075-91-PUB] N92-12043
The Columbus Free Flying Laboratory: Mechanical design aspects
[MBB-UO-0152-91-PUB] N92-12044
Columbus Free Flyer Center: Tasks and manpower profiles
[MBB-UO-0154-91-PUB] N92-12588
Columbus Free Flying Laboratory (MTFF) logistics, transportation, and ground processing
[MBB-UO-0155-91-PUB] N92-12589
COMBINATORIAL ANALYSIS
Bit-string scattering theory
[DE90-008013] N92-12555
A local limit theorem for L-statistics
[CWI-BS-R9033] N92-12582
COMBUSTIBLE FLOW
TURCOM: A computer code for the calculation of transient, multi-dimensional, turbulent, multi-component chemically reactive fluid flows. Part 2: Compressible and combusting flow
[NRC-29287-PT-2] N92-12214
COMBUSTION
A semi-analytical model for pressure-time history of granular pyrotechnic materials in a closed system
[DE90-012761] N92-12135
Monitoring IACP samples and construction of a centralized database
[PB91-213546] N92-12351
Microgravity science requirements and the need for data compression N92-12430
COMBUSTION CHAMBERS
An experimental and computational investigation of an annular reverse-flow combustor
[UTIAS-338] N92-11996
Development of advanced flow simulation system by water flow model
[DE90-503438] N92-12197
An experimental analysis of lateral jet injection into confined swirling crossflows N92-12199
Magnetohydrodynamic projects at the CDIF
[DE92-000396] N92-12735
COMBUSTION CONTROL
Compaction of TiH(1.65)/KClO4 pyrotechnic powder during confined burn
[DE90-013199] N92-12136
COMBUSTION PHYSICS
The 27th JANNAF Combustion Subcommittee Meeting, Volume 1
[CPIA-PUBL-557-VOL-1] N92-12048
Compaction of TiH(1.65)/KClO4 pyrotechnic powder during confined burn
[DE90-013199] N92-12136
COMBUSTION PRODUCTS
A semi-analytical model for pressure-time history of granular pyrotechnic materials in a closed system
[DE90-012761] N92-12135
Monitoring IACP samples and construction of a centralized database
[PB91-213546] N92-12351
Priority pollutant analysis of MHD-derived combustion products
[DE90-012630] N92-12689
COMET NUCLEI
Analysis and interpretation of CCD data on P/Halley and physical parameters and activity status of cometary nuclei at large heliocentric distance N92-12797
Physical processes in comets N92-12835
Groundbased cometary studies N92-12841
Radar interferometric studies of comets N92-12845
Spatially resolved quantitative spectroscopy of comets N92-12846
Physical studies of small asteroids and cometary nuclei N92-12855
Spectroscopy of comets N92-12856
Halley's spin state determined N92-12858
Clathrate type 2 hydrate formation in vacuo under astrophysical conditions N92-12906
COMET TAILS
Evolution on large-scale plasma structures in comets: Kinematics and physics N92-12801
The last disconnection events in Comet Halley in April 1986 N92-12862
Time-lapse CCD imagery of plasma-tail motions in Comet Austin N92-12874
COMETARY ATMOSPHERES
Theoretical spectroscopy of comets N92-12794
Analysis and interpretation of CCD data on P/Halley and physical parameters and activity status of cometary nuclei at large heliocentric distance N92-12797
Physical observations of comets: Their composition, origin and evolution N92-12805
Outer planet studies N92-12829
Groundbased cometary studies N92-12841
Radiative transfer in planetary atmospheres N92-12842
Radar interferometric studies of comets N92-12845
Spatially resolved quantitative spectroscopy of comets N92-12846
COMETS
Reports of planetary astronomy, 1991
[NASA-TM-4329] N92-12792
Observations of comets and asteroids N92-12793
Studies of asteroids, comets, and Jupiter's outer satellites N92-12800
Evolution on large-scale plasma structures in comets: Kinematics and physics N92-12801
Volatiles in the outer solar system N92-12807
Planetary Spectroscopy N92-12811
Infrared observations of comets N92-12815
Studies of relationships among outer solar system small bodies and related objects N92-12818
Palomar Planet-Crossing Asteroid Survey (PCAS) N92-12819
Laser studies of the photodissociation dynamics of cometary radicals N92-12823
Cometary spectroscopy and imaging N92-12827
Astrometric observations of comets and asteroids and subsequent orbital investigations N92-12830
Observational evidence of aging processes in comets N92-12833
Physical processes in comets N92-12835
Imaging studies of comets N92-12836
Ground-based observations of comets, the Jupiter plasma Torus, and Io N92-12840
Groundbased cometary studies N92-12841
Spatially resolved quantitative spectroscopy of comets N92-12846
Astrometric observations of comets and minor planets N92-12854
Physical studies of small asteroids and cometary nuclei N92-12855
Spectroscopy of comets N92-12856
Comet and asteroid dynamics N92-12857
The 1990 MB: The first Mars Trojan N92-12861
Physical observations of comets: Their composition, origin and evolution N92-12864
Detection of solid C(triple bond)N bearing materials on solar system bodies N92-12866
Radiative transfer in planetary atmospheres: Submillimeter-wave spectroscopy of comets N92-12885
Radar studies in the solar system N92-12886
Astrometric observations of comets and minor planets N92-12894
Minor planet 1566 Icarus: Asteroid or comet? N92-12895
COMMAND AND CONTROL
AFSCN command and control segment evolution N92-12017
Software design considerations for an airborne command and control workstation N92-12455
Advanced Satellite Workstation (ASW) N92-12521
C3I graphical applications N92-12541
COMMERCE
Group decision support systems N92-12502
Cross-functional systems N92-12504
The business case for connectivity N92-12507
The stock exchange market and company groups
[REPT-90-015] N92-12776
The organization of an options market: Case of the European options market
[REPT-90-016] N92-12777
COMMUNICATION EQUIPMENT
Optimality conditions for minimax tasks: An application example from communications engineering
[ETN-91-90169] N92-12156
Machine intelligence for survivable communications network management N92-12518
C3I graphical applications N92-12541
Engineering Graphical Analysis Tool (EGAT) development program N92-12542
COMMUNICATION NETWORKS
Control Center Technology Conference Proceedings
[NASA-CP-10081] N92-12010
Evaluation of components, subsystems, and networks for high rate, high frequency space communications
[NASA-TM-105274] N92-12151
Using NetMaster to manage IBM networks N92-12500
Machine intelligence for survivable communications network management N92-12518
Analysis and optimization of polling systems
[CWI-BS-R9102] N92-12548
COMMUNICATION THEORY
Process algebra with signals and conditions
[CWI-CS-R9103] N92-12510
COMMUTATORS
Consistency conditions and representations of a q-deformed Virasoro algebra
[DE90-013715] N92-12359
COMPACTING
Compaction of TiH(1.65)/KClO4 pyrotechnic powder during confined burn
[DE90-013199] N92-12136
COMPILERS
Process/object-oriented Ada software design for an experimental helicopter N92-12461
COMPLEX COMPOUNDS
Metallacumulenes and carbide complexes
[DE90-011324] N92-12073
Optical properties of MX chain materials: An extended Peierls-Hubbard model
[DE92-000314] N92-12764
COMPLEX SYSTEMS
System-based component test problem: The design of optimum system based component test plans N92-12587
COMPONENT RELIABILITY
The repetitive high energy pulsed power module
[DE90-013076] N92-12164
System-based component test problem: The design of optimum system based component test plans N92-12587
COMPOSITE MATERIALS
Acoustic emission applied to composite material structures
[REPT-911-430-138] N92-12067
High-temperature corrosion of Nicalon(tm)/SiC composites
[DE92-000281] N92-12071
COMPOSITE STRUCTURES
Design of an industrial CT system for very large composite structures
[REPT-911-430-133] N92-12145
Methods for improving damping. Part 1: An introduction and guide to practical methods of increasing structural damping
[ESDU-91012-PT-1] N92-12301
COMPRESSIBILITY EFFECTS
Numerical simulation of compressible homogeneous turbulence N92-12204
COMPRESSIBLE BOUNDARY LAYER
Turbulent boundary layer solution for two-dimensional compressible flow using mixing length and K-epsilon turbulence models
[AD-A233771] N92-12213
COMPRESSIBLE FLOW
Procedure for determination of three-dimensional wind tunnel wall interferences and wall adaptation in compressible subsonic flow using measured wall pressures
[DLR-FB-91-09] N92-12005
Numerical simulation of compressible homogeneous turbulence N92-12204
Boundary layer transition
[CERT-RTS-55/5018-45] N92-12210
Turbulent boundary layer solution for two-dimensional compressible flow using mixing length and K-epsilon turbulence models
[AD-A233771] N92-12213
TURCOM: A computer code for the calculation of transient, multi-dimensional, turbulent, multi-component chemically reactive fluid flows. Part 2: Compressible and combusting flow
[NRC-29287-PT-2] N92-12214
COMPRESSION TESTS
Improved specimen support jig for hot-wet compression testing
[NRC-LTR-ST-1790] N92-12059
COMPRESSION WAVES
Comparison of some different formulae for ground shock prediction
[FFI-90/4006] N92-12363
COMPRESSOR ROTORS
Numerical verification of NISA 2 finite element analysis of the cracked 5th stage compressor disc of J-85 jet engine
[NRC-LTR-ST-1792] N92-11997

COMPRESSORS
Hardware development and initial subassembly test of a gas-fired Stirling/Rankine residential heat pump
[DE90-012203] N92-12194
Experimental analysis of direct-expansion ground-coupled heat pump systems
[DE92-000420] N92-12226

COMPTON EFFECT
Nucleosynthetic gamma ray lines and positrons from supernovae N92-12983

COMPUTATION
MacSPOC: Orbital trajectory calculations on a laptop computer N92-12027
Novel approaches to the calculation of the electronic structure and dynamics of excited states: Application to trans-di-imide and ethylene
[ETN-91-90309] N92-12628
Semiclassical calculation of the vibrational structure of the (B) 1B(sub u) Rydberg state of trans-di-imide from ab initio CI potential energy surfaces N92-12629
Three-dimensional quantum calculations on the ground and excited state vibrations of ethylene N92-12632
Magnetic field in the SSC arc quad
[DE92-000656] N92-12670

COMPUTATIONAL ASTROPHYSICS
The formation and evolution of domain walls N92-12965

COMPUTATIONAL GRIDS
Numerical solution of incompressible Navier-Stokes equations using a velocity-vorticity formulation N92-12205
A highly parallel multigrid-like method for the solution of the Euler equations
[NASA-CR-188816] N92-12496
A two-grid analysis of the combination of mixed finite elements and Vanka-type relaxation
[CWI-NM-R9102] N92-12566
Local uniform grid refinement for time-dependent partial differential equations
[CWI-NM-R9105] N92-12569

COMPUTER AIDED DESIGN
ACLICO: An aid system for designing bonded joints
[REPT-911-430-134] N92-12146
Bulletin of the Division of Electrical Engineering, 1987-1988, volume 3, number 2
[NRC-29078-VOL-3-NO-2] N92-12177
Requirements and traceability management N92-12453
Process/object-oriented Ada software design for an experimental helicopter N92-12461
Computer aided design of weapon system guidance and control with predictive functional control technique N92-12463
CAD/CAM activities at NRC: 1988
[NRC-29225] N92-12477
A computer program for the 2-D magnetostatic problem based on integral equations for the field of the conductors and boundary elements
[DE92-000130] N92-12596

COMPUTER AIDED MANUFACTURING
CAD/CAM activities at NRC: 1988
[NRC-29225] N92-12477

COMPUTER AIDED TOMOGRAPHY
Design of an industrial CT system for very large composite structures
[REPT-911-430-133] N92-12145
Study of detached turbulent flow in an air intake by means of high speed tomography and laser velocimetry
[REPT-90/55] N92-12216
Mathematical morphology and active contour model: A cooperative approach of lung contours in CT
[TELECOM-PARIS-91-C-004] N92-12405

COMPUTER ASSISTED INSTRUCTION
Enhanced use of CLIPS at the Los Alamos National Laboratory
[DE92-000305] N92-12493
A knowledge-based intelligent tutoring system: ACQUIRE (tm)-ITS N92-12543

COMPUTER GRAPHICS
A fast online event display for a high intensity fixed-target spectrometer
[DE90-012047] N92-12443
Analyst workbench N92-12464
Morphological discretization
[CWI-BS-R9105] N92-12479
On the construction of translation and rotation invariant morphological operators
[CWI-AM-R9025] N92-12486
C3I graphical applications N92-12541

COMPUTER INFORMATION SECURITY
MOD control center automated information systems security evolution N92-12030
Bibliography for computer security, integrity, and safety
[NASA-CR-188950] N92-12439

COMPUTER NETWORKS
Control Center Technology Conference Proceedings
[NASA-CP-10081] N92-12010
B-2 and other current flight test control center system architectures N92-12011
JPL's Space Flight Operations Center: Development project overview N92-12012
A scalable coherent cache system with incomplete directory state
[DE90-010862] N92-12434
Los Alamos National Laboratory's high-performance data system
[DE92-000223] N92-12442
Network programming: A design method and programming strategy for large software systems N92-12459
Networking at NASA. Johnson Space Center N92-12498
Using NetMaster to manage IBM networks N92-12500
Requirements for a network storage service in a supercomputer environment
[DE92-000245] N92-12513
NFS(tm), Kerberos(tm), and UNICOS(r)
[DE92-000246] N92-12514
NFS as a user interface to a high-performance data system
[DE92-000254] N92-12515
A distributed environment for testing cooperating expert systems N92-12519
Analysis and optimization of polling systems
[CWI-BS-R9102] N92-12548

COMPUTER PROGRAMMING
Thermal battery statistics and plotting programs
[DE90-013873] N92-12170
Automatic programming of simulation models
[NASA-CR-184221] N92-12448
The data oriented requirements implementation scheme N92-12460
Software methodologies for safety critical systems N92-12467
Integration of applicative and object oriented programming
[ETN-91-90168] N92-12478
A general software reliability process simulation technique
[NASA-CR-189037] N92-12482
Process algebra with signals and conditions
[CWI-CS-R9103] N92-12510
An assessment of the ModSim/TWOS parallel simulation environment
[DE91-011400] N92-12512
A development-memory approach for enhancing avionics software logistics N92-12540

COMPUTER PROGRAMS
Numerical verification of NISA 2 finite element analysis of the cracked 5th stage compressor disc of J-85 jet engine
[NRC-LTR-ST-1792] N92-11997
Computer programs for the calculation of dual sting pitch and roll angles required for an articulated sting to obtain angles of attack and sideslip on wind-tunnel models
[NASA-TM-104161] N92-12007
Huntsville Operations Support Center N92-12024
The calculation of theoretical coherent anti-Stokes Raman spectra
[NRC-29810] N92-12085
Alternative motor fuel use model: Model theory and design and user's guide
[DE90-012040] N92-12134
An improved model-creation program for EM interaction analysis
[NRC-31764] N92-12153
Calculated non-linear magnetic field penetration of plasma opening switches
[DE90-013156] N92-12166
Thermal battery statistics and plotting programs
[DE90-013873] N92-12170
TURCOM: A computer code for the calculation of transient, multi-dimensional, turbulent, multi-component chemically reactive fluid flows. Part 2: Compressible and combusting flow
[NRC-29287-PT-2] N92-12214
COMMIX-1AR/P: A three-dimensional transient single-phase computer program for thermal hydraulic analysis of single and multicomponent systems
[DE91-018703] N92-12222
Vibroacoustic Payload Environment Prediction System (VAPEPS): VAPEPS management center remote access guide
[NASA-CR-189448] N92-12292
A feasibility study of using ABAQUS finite element analysis for creep with microstructural material damage
[NRC-LTR-ST-1791] N92-12305
Probabilistic Structural Analysis Methods (PSAM) for select space propulsion systems components
[NASA-CR-187199] N92-12307
Large angle transient dynamics (LATDYN) documentation. Post-processor manual
[NASA-TM-104126] N92-12309
Numerical simulation of plasticity at high strain rate
[DE91-011403] N92-12314
Implementation of a modified Johnson and Hindmarsh mass and energy model
[DE90-000488] N92-12329
Three-dimensional forecasting models on a desk-top computer
[DE90-010612] N92-12347
A fast online event display for a high intensity fixed-target spectrometer
[DE90-012047] N92-12443
Software for Guidance and Control
[AGARD-CP-503] N92-12449
Military and civil software standards and guidelines for guidance and control N92-12452
A practical experience of Ada for developing embedded software N92-12465
Software methodologies for safety critical systems N92-12467
Common Ada Missile Packages (CAMP) N92-12468
Generalized finite element gap model
[AD-A240559] N92-12471
A general software reliability process simulation technique
[NASA-CR-189037] N92-12482
Enhanced use of CLIPS at the Los Alamos National Laboratory
[DE92-000305] N92-12493
Reverse engineering tools for software: A small study
[DE92-000650] N92-12495
A distributed environment for testing cooperating expert systems N92-12519
Adaptive tactical navigation program N92-12529
A development-memory approach for enhancing avionics software logistics N92-12540
A knowledge-based intelligent tutoring system: ACQUIRE (tm)-ITS N92-12543
A computer program for the 2-D magnetostatic problem based on integral equations for the field of the conductors and boundary elements
[DE92-000130] N92-12596
JAZELLE: An enhanced data management system for high energy physics
[DE90-013571] N92-12662
Manual for a pattern generator
[LINO-1991-2] N92-12665
Full surface testing of grazing incidence mirrors
[AD-A240356] N92-12676
An algorithm for determining EF coils from fixed-boundary equilibria applied to ARIES 3
[DE92-000170] N92-12730
Goldstone solar system radar N92-12824
Aqueous alteration on the parent bodies of carbonaceous chondrites: Computer simulations of late-stage oxidation N92-12908

COMPUTER STORAGE DEVICES
Integrated, non-volatile, high-speed analog random access memory
[NASA-CASE-NPO-17998-1-CU] N92-12438
Los Alamos National Laboratory's high-performance data system
[DE92-000223] N92-12442
Requirements for a network storage service in a supercomputer environment
[DE92-000245] N92-12513
NFS as a user interface to a high-performance data system
[DE92-000254] N92-12515

COMPUTER SYSTEMS DESIGN
Formal specification of satellite telemetry: A practical experience N92-12456
Common Ada Missile Packages (CAMP) N92-12468
A distributed environment for testing cooperating expert systems N92-12519
TACAID: A knowledge based system for tactical decision making N92-12524
Pilot's associate: Evolution of a functional prototype N92-12531

COMPUTER SYSTEMS PERFORMANCE
A standard test set for numerical approximations to the shallow water equations in spherical geometry
[DE92-000385] N92-12365
Software design considerations for an airborne command and control workstation N92-12455
Formal verification of a redundancy management algorithm N92-12457
Group decision support systems N92-12502
TACAID: A knowledge based system for tactical decision making N92-12524

COMPUTER SYSTEMS PROGRAMS
Advanced technologies for Mission Control Centers N92-12028
Development and verification of software for flight safety critical systems N92-12469
NFS(tm), Kerberos(tm), and UNICOS(r) [DE92-000246] N92-12514
Locally linear neural networks for aerospace navigation systems N92-12530
COMPUTER TECHNIQUES
NASA Ames-Dryden integrated test facility: Presentation outline N92-12014
Advanced technologies for Mission Control Centers N92-12028
MOD control center automated information systems security evolution N92-12030
Computer aided modelization of ribosomic data [ETN-91-90161] N92-12391
Computer conferencing: Choices and strategies N92-12503
Development of tactical decision aids N92-12532
Recognition of three dimensional shapes: Application to chemical molecules [TELECOM-PARIS-90-E-018] N92-12613
Decision support system development using a migration approach [DE91-018860] N92-12774
COMPUTER VISION
Bulletin of the Division of Electrical Engineering, 1987-1988, volume 3, number 2 [NRC-29078-VOL-3-NO-2] N92-12177
Monocular 3D vision for a robot assembly environment [DE90-010824] N92-12264
Three dimensional reconstruction of vascular networks in trinocular vision [TELECOM-PARIS-90-E-022] N92-12406
Direct estimation of deformable motion parameters from a range image sequence [NRC-31757] N92-12476
COMPUTERIZED SIMULATION
Investigation of the aeroelastic stability of the AFW wind-tunnel model using CAP-TSD [NASA-TM-104142] N92-11977
Alternative motor fuel use model: Model theory and design and user's guide [DE90-012040] N92-12134
An improved model-creation program for EM interaction analysis [NRC-31764] N92-12153
Thermal analysis report of the SANDAC V processor module [DE91-018889] N92-12191
Numerical simulation of compressible homogeneous turbulence N92-12204
Numerical solution of incompressible Navier-Stokes equations using a velocity-vorticity formulation N92-12205
Vorticity dynamics of inviscid shear layers [NASA-CR-189042] N92-12212
Error analysis of a ratio pyrometer by numerical simulation [DE90-011500] N92-12229
Error analysis by numerical simulation for a three-color pyrometer assuming a blackbody spectrum and a wavelength and temperature dependent emissivity [DE90-011504] N92-12230
Three-dimensional particle-in-cell modeling of relativistic electron beam production and transport for KrF laser pumping [DE90-013050] N92-12247
Even harmonic lasing [DE92-000207] N92-12263
Determination of the contact forces between a projectile and a hard target [DE91-018354] N92-12281
Computer modeling of arc welds to predict effects of critical variables on weld penetration [DE92-000428] N92-12283
Geologic mapping of tunnels using photogrammetry-control-point configuration [DE91-019071] N92-12323
Implementation of a modified Johnson and Hindmarsh mass and energy model [DE90-000488] N92-12329
A concept for treating dense-gas dispersion under realistic conditions of terrain and variable winds [DE90-012892] N92-12343
Measurement of charge exchange reaction constants both at equilibrium and out of equilibrium in a Paul trap [ETN-91-90103] N92-12361
Simulating climate with two different numerical schemes [DE90-011777] N92-12367
A Pacific Ocean general circulation model for satellite data assimilation [NASA-CR-189447] N92-12384
Gridless electrostatic field solver for particle simulation codes in cylindrical geometry [DE90-013602] N92-12445
Automatic programming of simulation models [NASA-CR-184221] N92-12448
A methodology for software specification and development based on simulation N92-12458
Network programming: A design method and programming strategy for large software systems N92-12459
Integration of applicative and object oriented programming [ETN-91-90168] N92-12478
Three dimensional shallow water model on the Cray Y-MP4/464 [CWI-NM-R9106] N92-12487
Using computer experiments to construct a cheap substitute for an expensive simulation model --- application to a compression molding process [DE92-000421] N92-12494
An assessment of the ModSim/TWOS parallel simulation environment [DE91-011400] N92-12512
Locally linear neural networks for aerospace navigation systems N92-12530
A Monte Carlo study of the light (q sup 2)(bar q sup 2) system [DE92-000449] N92-12580
Aqueous alteration on the parent bodies of carbonaceous chondrites: Computer simulations of late-stage oxidation N92-12908
CONCENTRATION (COMPOSITION)
Current issues in sol-gel reaction kinetics [DE90-012226] N92-12074
Objective method for assessing monitoring networks [DE90-505577] N92-12346
CONCRETE STRUCTURES
The effect of berming on the response of structures subjected to nearby detonations [FFI-91/4005] N92-12310
CONCRETES
Determination of the contact forces between a projectile and a hard target [DE91-018354] N92-12281
CONCURRENT PROCESSING
Coprocessor support for real-time Ada N92-12454
Embedding as a tool for language comparison [CWI-CS-R9102] N92-12483
CONDENSATES
Decay of spin-polarized atomic hydrogen in the presence of a Bose condensate N92-12624
The origin of amorphous rims on lunar plagioclase grains: Solar wind damage or vapor condensates N92-12918
CONDENSED MATTER PHYSICS
Monte Carlo approaches to effective field theories [DE92-000198] N92-12771
CONDENSERS (LIQUEFIERS)
Production of desalinated water using ocean thermal energy [DE91-018894] N92-12336
CONDENSING
Humidity effects on gas turbine performance [NRC-30241] N92-11998
Few-body collisions in a weakly interacting Bose gas [ETN-91-90307] N92-12621
CONDUCTION ELECTRONS
A simple model for localized-itinerant magnetic systems: Crystal field effects [DE90-625399] N92-12746
CONDUCTIVE HEAT TRANSFER
Fluid oscillations and enhanced heat transfer in a parallel plate channel bounded by end reservoirs maintained at different temperature N92-12202
Energy models for one-carrier transport in semiconductor devices [NASA-CR-189046] N92-12557
CONFERENCES
Control Center Technology Conference Proceedings [NASA-CP-10081] N92-12010
Workshop on Scientific and Industrial Applications of Free Electron Lasers [DE90-012038] N92-12245
Software for Guidance and Control [AGARD-CP-503] N92-12449
Networking as a Strategic Tool, 1991 [NASA-CR-188124] N92-12497
Computer conferencing: Choices and strategies N92-12503
Large Hadron Collider Workshop. Volume 2: Proceedings [DE91-634595] N92-12663
High-Energy Astrophysics. American and Soviet Perspectives [NASA-CR-186558] N92-12933
CONJUGATE GRADIENT METHOD
On a generalized Polak-Ribiere algorithm for unconstrained minimization [MATHS-REPT-A-148] N92-12491
Motivating quasi-Newton updates by preconditioned conjugate gradient methods [MATHS-REPT-A-150] N92-12577
CONSERVATION LAWS
Lagrangian analysis, data covariance, and the impulse time integral [DE92-000169] N92-12224
Energy models for one-carrier transport in semiconductor devices [NASA-CR-189046] N92-12557
CONSTITUTIVE EQUATIONS
A feasibility study of using ABAQUS finite element analysis for creep with microstructural material damage [NRC-LTR-ST-1791] N92-12305
Numerical simulation of plasticity at high strain rate [DE91-011403] N92-12314
CONSTRAINTS
Convexly constrained ill posed problems and their regularization, using iterative processes [ETN-91-90156] N92-12560
CONSTRUCTION MATERIALS
Conventional wallboard with latent heat storage for passive solar applications [DE90-012136] N92-12325
Analysis of wallboard containing a phase change material [DE90-012163] N92-12326
CONTACT LOADS
The theory of variational inequalities and its application to contact problems with friction [ETN-91-90183] N92-12562
CONTAINMENT
Environmental projects. Volume 13: Underground storage tanks, removal and replacement. Goldstone Deep Space Communications Complex [NASA-CR-189030] N92-12035
CONTAMINANTS
Mercury as an environmental pollutant [DE90-013392] N92-12349
Priority pollutant analysis of MHD-derived combustion products [DE90-012630] N92-12689
CONTAMINATION
Mercury as an environmental pollutant [DE90-013392] N92-12349
CONTINENTAL SHELVES
Outer continental shelf environmental assessment program. Volume 73: Final Reports of principal investigators [PB91-204917] N92-12382
CONTINUITY
Selected methods for the investigation of linear, continuous and discrete-continuous mechanical models of a rail [ILR-MITT-261(1991)] N92-12277
CONTINUOUS WAVE LASERS
A tunable continuous-wave titanium-doped sapphire laser [FFI-91/7006] N92-12254
CONTINUUM MODELING
Monte Carlo approaches to effective field theories [DE92-000198] N92-12771
CONTOUR SENSORS
Algebraic error analysis for surface curvatures of 3-D range images [NRC-30297] N92-12559
CONTOURS
Mathematical morphology and active contour model: A cooperative approach of lung contours in CT [TELECOM-PARIS-91-C-004] N92-12405
CONTRAST
Perceived sharpness in static and moving images [ETN-91-90138] N92-12413
CONTROL
Examination of sampling control systems for inverters of limited pulse repetition [ETN-91-90159] N92-12181
CONTROL BOARDS
Software for Guidance and Control [AGARD-CP-503] N92-12449
CONTROL EQUIPMENT
Rapid development of a measurement and control system for the Advanced Free-Electron Laser [DE92-000178] N92-12261
CONTROL MOMENT GYROSCOPES
Optimal control of large space structures using distributed gyricity: A continuum approach [UTIAS-341] N92-12042

CONTROL STABILITY
The development of a requirement specification for an experimental active flight control system for a variable stability helicopter: An Ada simulation in JSD N92-12466
CONTROL SYSTEMS DESIGN
Practical input optimization for aircraft parameter estimation experiments N92-11989
B-2 and other current flight test control center system architectures N92-12011
Ground support system methodology and architecture N92-12018
MOD control center automated information systems security evolution N92-12030
Hierarchical controlled component synthesis of large space structures
[DE90-013476] N92-12038
Design and development of proprioceptive sensors to be used for mobile robot localization
[LAAS-91178] N92-12238
Rapid development of a measurement and control system for the Advanced Free-Electron Laser
[DE92-000178] N92-12261
Stiffness control of teleoperators with redundant, dissimilar kinematics
[DE90-011642] N92-12265
Development and verification of software for flight safety critical systems N92-12469
Machine Intelligence for Aerospace Electronic Systems
[AGARD-CP-499] N92-12517
Advanced Satellite Workstation (ASW) N92-12521
CONTROL THEORY
Application of Eigenstructure Assignment to the control of powered lift combat aircraft
[RAE-TM-FS-1009] N92-12004
An analytical and experimental study to investigate flutter suppression via piezoelectric actuation
[NASA-TM-893240] N92-12173
Computer aided design of weapon system guidance and control with predictive functional control technique N92-12463
The development of a requirement specification for an experimental active flight control system for a variable stability helicopter: An Ada simulation in JSD N92-12466
Robustness of feedback stabilization: A topological approach
[ETN-91-90142] N92-12545
A method of computing smooth transitions between a sequence of straight line paths for an autonomous vehicle
[NRC-31776] N92-12547
Constrained receding-horizon predictive control
[REPT-90-062] N92-12551
CONTROLLED FUSION
MTX (Microwave Tokamak Experiment) data acquisition and analysis computer network
[DE90-013066] N92-12694
CONTROLLERS
Air-breathing hypersonic vehicle guidance and control studies; An integrated trajectory/control analysis methodology: Phase 1
[NASA-CR-187623] N92-12002
Rapid development of a measurement and control system for the Advanced Free-Electron Laser
[DE92-000178] N92-12261
Sensory processing and world modeling for an active ranging device
[NASA-CR-188915] N92-12319
Code generation for fast DSP-based real-time control N92-12462
CONVECTION
Combined buoyancy-thermocapillary convection
[NASA-CR-187417] N92-12207
An analysis of thermosolutal convection during the crystal growth of CdTe from Te solution by the THM
[REPT-911-430-135] N92-12755
CONVECTION CURRENTS
Determination of diffusion coefficients in liquids using the diaphragm cell method
[DE91-018403] N92-12093
CONVECTIVE FLOW
Combined buoyancy-thermocapillary convection
[NASA-CR-187417] N92-12207
CONVECTIVE HEAT TRANSFER
The variable polarity plasma arc welding process: Characteristics and performance
[NASA-CR-184259] N92-12279
CONVERGENCE
Time delay and finite differences for the nonstationary nonlinear Navier-Stokes equations
[PREPRINT-1359] N92-12218
Joint carrier phase estimation and symbols decoding of trellis codes
[TELECOM-PARIS-91-C-003] N92-12473
Difference and differential Riccati equations: A note on the convergence to the strong solution
[REPT-90-015] N92-12572
On the convergence to the strong solution of periodic Riccati equations
[REPT-90-021] N92-12575
COOLING
Channel cooling-techniques for repetitively pulsed magnetic switches
[DE90-013077] N92-12165
Workshop on High Heat Load X Ray Optics
[DE90-011799] N92-12673
Effect of cooling rate on the transition temperature in Bi-Pb-Sr-Ca-Cu-O system
[DE91-628643] N92-12762
COOLING FLOWS (ASTROPHYSICS)
Photoionization of intergalactic gas and cooling flows in clusters of galaxies N92-12896
Hydrodynamic study of Supernova 1987A: The phase of a wave of cooling and recombination N92-12973
Physical conditions and heating/cooling processes in high mass star formation regions
[MPE-PREPRINT-200] N92-12974
COOLING SYSTEMS
Channel cooling-techniques for repetitively pulsed magnetic switches
[DE90-013077] N92-12165
COMMIX-1AR/P: A three-dimensional transient single-phase computer program for thermal hydraulic analysis of single and multicomponent systems
[DE91-018703] N92-12222
COPOLYMERIZATION
Influences of expanding monomer on carbon fiber reinforced epoxy composites 2
[AD-A240583] N92-12057
COPPER
I.S.O. international program on the study of atmospheric corrosion: Results of first year exposure at Boucherville, October 1986 - October 1987
[NRC-28896] N92-12106
The role of inhibitors during electrodeposition of thin metallic films
[DE90-014177] N92-12750
COPPER ALLOYS
The EDM surface: Topography, chemistry, and metallurgy
[DE91-017756] N92-12110
COPPER COMPOUNDS
Pressure dependence of the specific heat of heavy-fermion YbCu4.5
[DE90-011584] N92-12742
COPPER OXIDES
Effects of ambient background gases on YBCO plume propagation under film growth conditions: Spectroscopic, ion probe, and fast photographic studies
[DE92-000431] N92-12737
Specific heat of La(2-x)Sr(x)CuO4; volume fraction of superconductivity; possible structural transition at 45 K
[DE90-011585] N92-12744
Superconducting La2CuO(4+x) prepared by oxygenation at high pressure: A Raman scattering study
[DE90-012915] N92-12747
Stoichiometry and irradiation effects in melt grown Tl-Ca-Ba-Cu-O single crystals
[DE90-013365] N92-12749
Magnetization studies of irradiation modified single crystal Y1Ba2Cu3O7 superconductors: Flux creep and annealing effects
[DE91-018858] N92-12758
Properties of epitaxial YBa2Cu3O(7-delta)-based superconducting superlattices
[DE92-000423] N92-12765
Laser ablation synthesis and properties of epitaxial YBa2Cu3O(7-delta) / PrBa2Cu3O(7-delta) superconducting superlattices
[DE92-000447] N92-12766
CORES
Starting currents in coils with conductive permeable core, allowing for induced eddy currents
[ETN-91-90158] N92-12180
CORONAS
Influence of wave-particle interactions on solar flare dynamics N92-12978
CORRECTION
Humidity effects on gas turbine performance
[NRC-30241] N92-11998
CORRELATION
Design and testing of space-domain minimum average correlation energy (SMACE) filters for 2-D acousto-optic correlators
[DE91-019062] N92-12602
CORRELATORS
Design and testing of space-domain minimum average correlation energy (SMACE) filters for 2-D acousto-optic correlators
[DE91-019062] N92-12602
CORROSION
Corrosion and your aircraft
[NRC-30465] N92-11991
Atomic oxygen interaction with spacecraft materials: Relationship between orbital and ground-based testing for materials certification
[NASA-TM-105449] N92-12046
High-temperature corrosion of Nicalon(tm)/SiC composites
[DE92-000281] N92-12071
Current programmes of Metallurgy Division, 1991
[DE91-634904] N92-12104
Particle measurement and brine chemistry at the Salton Sea Deep Well
[DE92-000031] N92-12337
CORROSION PREVENTION
Environmental projects. Volume 13: Underground storage tanks, removal and replacement. Goldstone Deep Space Communications Complex
[NASA-CR-189030] N92-12035
CORROSION RESISTANCE
Development of surface treatments and alloy modifications for corrosion-resistant oxide scales
[DE90-012723] N92-12097
PVD layers for corrosion protection of high strength Al-alloys
[MBB-Z-0360-91-PUB] N92-12108
CORROSION TESTS
I.S.O. international program on the study of atmospheric corrosion: Results of first year exposure at Boucherville, October 1986 - October 1987
[NRC-28896] N92-12106
COSMIC DUST
Infrared studies of star formation in the rho Ophiuchi dark cloud N92-12790
Infrared observations of comets N92-12815
Physical processes in comets N92-12835
Interstellar organics and possible connections with the carbonaceous components of meteorites and IDPs N92-12902
COSMIC GASES
Photoionization of intergalactic gas and cooling flows in clusters of galaxies N92-12896
COSMIC RAYS
D0 data acquisition: High speed data paths for D0
[DE90-013326] N92-12444
Cosmogenic Ar-36 from neutron capture by Cl-35 in the Chico L6 chondrite: Additional evidence for large shielding N92-12914
On the origin of the diffuse x ray background N92-12952
Cosmic gamma-ray bursts N92-12954
The estimation of the dose from cosmic radiation received by the population living at mainland of China
[DE91-631668] N92-12985
COSMIC X RAYS
Radiation-driven evolution of low-mass x ray binaries and the formation of millisecond pulsars
[DE92-000123] N92-12975
COSMOLOGY
Infrared observations of solar system objects N92-12828
Outer planet studies N92-12829
Prospects in extended inflation N92-12900
Cosmogenic Ar-36 from neutron capture by Cl-35 in the Chico L6 chondrite: Additional evidence for large shielding N92-12914
High-Energy Astrophysics. American and Soviet Perspectives
[NASA-CR-186558] N92-12933
Chaotic inflationary universe and the anisotropy of the large-scale structure N92-12943
The formation and evolution of domain walls N92-12965
Basic physics and cosmology from pulsar timing data N92-12971
COST ANALYSIS
Ground support system methodology and architecture N92-12018
Photovoltaics: New opportunities for utilities
[DE91-002168] N92-12334
A plan for the study of the costs and environmental impact of fusion compared with alternative energy sources
[DE90-013068] N92-12696
COST EFFECTIVENESS
On the feasibility of numerical analysis of large creep problems N92-12298
COUNTERMEASURES
Automated threat response recommendation in environments of high data uncertainty using the Countermeasure Association Technique (CMAT) N92-12525
COUNTING
Extragalactic x ray source counts N92-12967

COUNTING CIRCUITS
The energy complexity of threshold and other functions (preliminary version)
[CWI-CS-R9101] N92-12186
COUPLING
Narrow-bandwidth diffraction-limited coupled stable-unstable resonator laser cavity
[AD-D014974] N92-12251
COVARIANCE
Lagrangian analysis, data covariance, and the impulse time integral
[DE92-000169] N92-12224
CRACK ARREST
Dynamic delamination crack propagation in a graphite/epoxy laminate
[NASA-CR-187226] N92-12063
CRACK OPENING DISPLACEMENT
Wave propagation and scattering in layered media: Application to ultrasonic nondestructive evaluation of interfacial cracks and earthquake ground motion N92-12285
CRACK PROPAGATION
Dynamic delamination crack propagation in a graphite/epoxy laminate
[NASA-CR-187226] N92-12063
Detailed behavior of a glued double layer assembly in terms of the shearing-off of joint covers N92-12069
Fatigue crack propagation rates of experimental aluminum lithium sheet and plate alloys
[ESDU-91015] N92-12102
Determination of the impact fracture parameters in ductile polymers
[NRC-28433] N92-12128
Vickers microindentation toughness of a sintered SiC in the median-crack regime
[DE92-000225] N92-12132
An experimental and numerical study of delamination propagation and arrest in composite beams and plates when subjected to low-velocity impact N92-12299
Crystallization behavior and effect of thermal history on fracture performance of glass flake reinforced polypropylene
[NRC-29450] N92-12752
CRACK TIPS
Numerical verification of NISA 2 finite element analysis of the cracked 5th stage compressor disc of J-85 jet engine
[NRC-LTR-ST-1792] N92-11997
CRACKING (FRACTURING)
Detailed behavior of a glued double layer assembly in terms of the shearing-off of joint covers N92-12069
Fatigue crack propagation rates of experimental aluminum lithium sheet and plate alloys
[ESDU-91015] N92-12102
CRANK-NICHOLSON METHOD
Time stepping procedures for the nonstationary Stokes equations
[PREPRINT-1353] N92-12217
CRATERING
Degradation studies of Martian impact craters N92-12905
Ar-39-Ar-40 of achondrites: Evidence for a lunar-like cataclysm N92-12907
CRATERS
The composition of meteoroids impacting LDEF N92-12910
Imaging analysis of LDEF craters N92-12927
CRAY COMPUTERS
Three dimensional shallow water model on the Cray Y-MP4/464
[CWI-NM-R9106] N92-12487
CREEP ANALYSIS
On the feasibility of numerical analysis of large creep problems N92-12298
A feasibility study of using ABAQUS finite element analysis for creep with microstructural material damage
[NRC-LTR-ST-1791] N92-12305
CREEP PROPERTIES
Creep in L1(2)-intermetallics
[DE91-018231] N92-12112
Mechanical properties and microstructure of pressureless sintered duophase sialon
[DE92-000043] N92-12131
CRITICAL POINT
Vapour pressures and critical points of liquids. Halogenated ethylenes
[ESDU-91006] N92-12081
CRITICAL PRESSURE
Thermal conductivity of gaseous halogenated hydrocarbons
[ESDU-91005] N92-12080
CRITICAL TEMPERATURE
Thermal conductivity of gaseous halogenated hydrocarbons
[ESDU-91005] N92-12080
The flux jumps in high Tc Bi(1.7)Pb(0.3)Sr2 Ca2Cu3O(y) bulk superconductor
[DE91-628641] N92-12760
CROSS FLOW
An experimental analysis of lateral jet injection into confined swirling crossflows N92-12199
CROSSINGS
Astrometric observations of comets and minor planets N92-12894
CRUDE OIL
The thermodynamic properties of benzothiazole and benzoxazole
[DE91-002250] N92-12769
CRYOGENIC TEMPERATURE
Cryogenic testing of fluoropolymer-coated stainless steel tubing
[DE90-008022] N92-12098
CRYSTAL DEFECTS
Magnetization studies of irradiation modified single crystal Y1Ba2Cu3O7 superconductors: Flux creep and annealing effects
[DE91-018858] N92-12758
CRYSTAL GROWTH
Optical studies in the holographic ground station
[NASA-CR-184257] N92-12239
CRYSTAL OPTICS
Analysis of cladded uniaxial single crystal fibers
[NRC-32596] N92-12678
Backward collinear acousto-optic interactions in bulk materials
[NRC-29095] N92-12679
CRYSTAL STRUCTURE
A simple model for localized-itinerant magnetic systems: Crystal field effects
[DE90-625399] N92-12746
CRYSTALLIZATION
Fractional crystallization in polymer mixing
[ETN-91-90184] N92-12129
Crystallization behavior and effect of thermal history on fracture performance of glass flake reinforced polypropylene
[NRC-29450] N92-12752
An analysis of thermosolutal convection during the crystal growth of CdTe from Te solution by the THM
[REPT-911-430-135] N92-12755
Dynamic crystallization characteristics of enstatite chondrite chondrules N92-12923
Olivines in angrite LEW 87051: Phenos or xenos N92-12924
CRYSTALLOGRAPHY
Orientation dependency of structural and chemical properties of Si(001) vicinal surfaces
[ETN-91-90154] N92-12754
CRYSTALS
Protein crystal growth in low gravity
[NASA-CR-188974] N92-12141
Optical studies in the holographic ground station
[NASA-CR-184257] N92-12239
A simple model for localized-itinerant magnetic systems: Crystal field effects
[DE90-625399] N92-12746
Magnetization studies of irradiation modified single crystal Y1Ba2Cu3O7 superconductors: Flux creep and annealing effects
[DE91-018858] N92-12758
CURRENT DENSITY
Thermal effects on the Josephson series-array voltage standard
[DE90-008738] N92-12160
Cathode applications to high-current diodes
[DE90-013290] N92-12172
Total magnetic reconnection during a tokamak major disruption
[DE90-014711] N92-12706
Magnetization studies of irradiation modified single crystal Y1Ba2Cu3O7 superconductors: Flux creep and annealing effects
[DE91-018858] N92-12758
CURRENT DISTRIBUTION
Internal dynamics of electrical discharges
[DE90-013161] N92-12169
CURVATURE
Segmentation of complex geometric forms by the curvature method
[NRC-31210] N92-12475
Algebraic error analysis for surface curvatures of 3-D range images
[NRC-30297] N92-12559
CUTTING
Welding in Space Workshop
[NASA-CR-184234] N92-12269
CYANATES
Corrosion under stress of AISI 304 steel in thiocyanate solutions
[DE91-631523] N92-12115
CYANOACETYLENE
Radar interferometric studies of comets N92-12845
Observations of formaldehyde and search for cyanoacetylene in Comet Brorsen-Metcalf (1988o) N92-12887
CYCLES
A minimum prediction error algorithm for estimation of periodic ARMA models
[REPT-90-016] N92-12573
Spectral factorization of linear periodic systems with application to the optimal prediction of periodic ARMA models
[REPT-90-013] N92-12768
CYCLOTRON RADIATION
Influence of wave-particle interactions on solar flare dynamics N92-12978
CYCLOTRONS
The GAMMASPHERE
[DE92-000448] N92-12986
CYGNUS CONSTELLATION
Gas flow and generation of x ray emission in WR+OB binaries N92-12972
CYLINDRICAL BODIES
Pitching moment derivative due to rate of pitch for projectiles at supersonic speeds
[ESDU-91004] N92-11967
Determination of the effects of wind-induced vibration on cylindrical beams
[NASA-TM-103824] N92-12300
Axially symmetrical supernova remnants N92-12937
CYLINDRICAL SHELLS
Waves and fields in structural acoustics: Fluid-loaded elastic cylindrical and spherical shells N92-12597

D

DAMAGE ASSESSMENT
A feasibility study of using ABAQUS finite element analysis for creep with microstructural material damage
[NRC-LTR-ST-1791] N92-12305
The effect of berming on the response of structures subjected to nearby detonations
[FFI-91/4005] N92-12310
DARK MATTER
A search for the coherent production of axions in the milli eV range
[DE92-000439] N92-12650
DATA ACQUISITION
A PC-based telemetry system for acquiring and reducing data from multiple PCM streams
[DE91-002199] N92-12037
Operations manual for reading VAK-3 ultrasonic seals using a data acquisition box
[DE90-013644] N92-12143
Climate Monitoring and Diagnostics Laboratory no. 18
[PB91-205559] N92-12371
Rangeland-plant response to elevated CO2
[DE90-013702] N92-12387
A special function coprocessor for level-2
[DE90-013327] N92-12435
D0 data acquisition: High speed data paths for D0
[DE90-013326] N92-12444
Research program in experimental high energy physics, task B
[DE90-013323] N92-12660
Development of high spectral resolution lidar technology
[DE92-000080] N92-12686
MTX (Microwave Tokamak Experiment) data acquisition and analysis computer network
[DE90-013066] N92-12694
HL-1 tokamak data acquisition system and its initial application in the physical experiment
[DE91-630701] N92-12725
Goldstone solar system radar N92-12824
DATA BASE MANAGEMENT SYSTEMS
Thermal battery statistics and plotting programs
[DE90-013873] N92-12170
Rapid development of a measurement and control system for the Advanced Free-Electron Laser
[DE92-000178] N92-12261
Vibroacoustic Payload Environment Prediction System (VAPEPS): VAPEPS management center remote access guide
[NASA-CR-189448] N92-12292
Large angle transient dynamics (LATDYN) documentation. Post-processor manual
[NASA-TM-104126] N92-12309
Vertical integration of science, technology, and applications
[DE90-013552] N92-12344
DBMS problems on the evolution of relational model to object model
[REPT-90-069] N92-12488

NFS as a user interface to a high-performance data system
[DE92-000254] N92-12515
JAZELLE: An enhanced data management system for high energy physics
[DE90-013571] N92-12662
Data management in heterogeneous environments and its implications to CEDR
[DE92-000651] N92-12785

DATA BASES
Vibroacoustic Payload Environment Prediction System (VAPEPS): VAPEPS management center remote access guide
[NASA-CR-189448] N92-12292
Large angle transient dynamics (LATDYN) documentation. Post-processor manual
[NASA-TM-104126] N92-12309
A database for the Geysers geothermal field
[DE90-013811] N92-12330
Monitoring IACP samples and construction of a centralized database
[PB91-213546] N92-12351
Scientific requirements for space science data systems N92-12429
A scalable coherent cache system with incomplete directory state
[DE90-010862] N92-12434
Analyst workbench N92-12464
Cooperative processing data bases N92-12505

DATA COMPRESSION
MERIS data compression: A presentation of the current status of the study
[REPT-911-440-113] N92-12322
Autonomous ocean profiler
[AD-A239800] N92-12383
Space and Earth Science Data Compression Workshop
[NASA-CP-3130] N92-12425
Data compression: The end-to-end information systems perspective for NASA space science missions N92-12426
The moderate resolution imaging spectrometer: An EOS facility instrument candidate for application of data compression methods N92-12427
SAR data compression: Application, requirements, and designs N92-12428
Scientific requirements for space science data systems N92-12429
Microgravity science requirements and the need for data compression N92-12430
Data compression for data archival, browse or quick-look N92-12431
Data compression for near Earth and deep space to Earth transmission N92-12432
Techniques for containing error propagation in compression/decompression schemes N92-12433

DATA CORRELATION
Vapour pressures and critical points of liquids. Halogenated ethylenes
[ESDU-91006] N92-12081

DATA FLOW ANALYSIS
A PC-based telemetry system for acquiring and reducing data from multiple PCM streams
[DE91-002199] N92-12037
SAR data compression: Application, requirements, and designs N92-12428

DATA LINKS
Autonomous ocean profiler
[AD-A239800] N92-12383

DATA MANAGEMENT
Ground support system methodology and architecture N92-12018
Automation for deep space vehicle monitoring N92-12022
Climate Monitoring and Diagnostics Laboratory no. 18
[PB91-205559] N92-12371
Contents of the JPL Distributed Active Archive Center (DAAC) archive, version 2-91
[NASA-CR-189027] N92-12784
Data management in heterogeneous environments and its implications to CEDR
[DE92-000651] N92-12785

DATA PROCESSING
Bulletin of the Division of Electrical Engineering, 1987-1988, volume 3, number 2
[NRC-29078-VOL-3-NO-2] N92-12177
Computer aided modelization of ribosomic data
[ETN-91-90161] N92-12391
Tool supported software development experiences from the EFA project N92-12451
Analyst workbench N92-12464
The syntax and semantics of micro CRL
[CWI-CS-R9076] N92-12480
Authentication of byte sequences
[DE92-000150] N92-12492
Cooperative processing data bases N92-12505
Integrating machine intelligence into the cockpit to aid the pilot N92-12533
Columbus Free Flying Laboratory (MTFF) logistics, transportation, and ground processing
[MBB-UO-0155-91-PUB] N92-12589
HL-1 tokamak data acquisition system and its initial application in the physical experiment
[DE91-630701] N92-12725
Information and information processing N92-12779

DATA PROCESSING EQUIPMENT
Goldstone solar system radar N92-12824

DATA REDUCTION
A PC-based telemetry system for acquiring and reducing data from multiple PCM streams
[DE91-002199] N92-12037
Interpreting measurements obtained with the cloud absorption radiometer
[NASA-CR-189241] N92-12366
SAR data compression: Application, requirements, and designs N92-12428
A special function coprocessor for level-2
[DE90-013327] N92-12435
The radon transform for data reduction, line detection, and artificial neural network preprocessing
[DE90-013521] N92-12516
Full surface testing of grazing incidence mirrors
[AD-A240356] N92-12676
Planetary astronomy N92-12804

DATA RETRIEVAL
Data compression for data archival, browse or quick-look N92-12431
Analyst workbench N92-12464

DATA SAMPLING
Optimal stochastic control of multirate sampled-data systems
[REPT-90-019] N92-12586

DATA SMOOTHING
Air-breathing hypersonic vehicle guidance and control studies; An integrated trajectory/control analysis methodology: Phase 1
[NASA-CR-187623] N92-12002

DATA STORAGE
The moderate resolution imaging spectrometer: An EOS facility instrument candidate for application of data compression methods N92-12427
Data compression for data archival, browse or quick-look N92-12431
Data compression for near Earth and deep space to Earth transmission N92-12432
Authentication of byte sequences
[DE92-000150] N92-12492

DATA STRUCTURES
Sensory processing and world modeling for an active ranging device
[NASA-CR-188915] N92-12319

DATA SYSTEMS
Real Time Data System (RTDS) N92-12019
Real Time Data System (RTDS) N92-12025
Data compression: The end-to-end information systems perspective for NASA space science missions N92-12426
Scientific requirements for space science data systems N92-12429
Los Alamos National Laboratory's high-performance data system
[DE92-000223] N92-12442
NFS as a user interface to a high-performance data system
[DE92-000254] N92-12515
Contents of the JPL Distributed Active Archive Center (DAAC) archive, version 2-91
[NASA-CR-189027] N92-12784

DATA TRANSMISSION
Data compression: The end-to-end information systems perspective for NASA space science missions N92-12426
The moderate resolution imaging spectrometer: An EOS facility instrument candidate for application of data compression methods N92-12427
Data compression for near Earth and deep space to Earth transmission N92-12432
Techniques for containing error propagation in compression/decompression schemes N92-12433
Performance analysis of LAN bridges and routers N92-12501

DECAY
Examination of excitation and decay of giant resonances in Ca-40 by (e,e'x) coincidence experiments
[ETN-91-90174] N92-12617
Decay of spin-polarized atomic hydrogen in the presence of a Bose condensate N92-12624

DECISION MAKING
Real Time Data System (RTDS) N92-12025
Group decision support systems N92-12502
Machine intelligence for survivable communications network management N92-12518
TACAID: A knowledge based system for tactical decision making N92-12524
Pilot's associate: Evolution of a functional prototype N92-12531
Development of tactical decision aids N92-12532
AI for RPVs, Sensor Driven Airborne Replanner (SDAR), for a Robotic Aircraft Sensor Platform (RASP) N92-12534
Using AITEST to troubleshoot a Radar Modulator (RM) unit: A case study in the application of expert systems to intermediate-level testing N92-12537
Reasoning with uncertain and incomplete information in aerospace applications N92-12544
Decision support system development using a migration approach
[DE91-018860] N92-12774

DECISION THEORY
Automation for deep space vehicle monitoring N92-12022
On finding minimum-diameter clique trees
[DE92-000386] N92-12579

DECODING
Joint carrier phase estimation and symbols decoding of trellis codes
[TELECOM-PARIS-91-C-003] N92-12473

DECOMPOSITION
Monte Carlo approaches to effective field theories
[DE92-000198] N92-12771

DEEP SPACE NETWORK
Environmental projects. Volume 13: Underground storage tanks, removal and replacement. Goldstone Deep Space Communications Complex
[NASA-CR-189030] N92-12035

DEFECTS
The acoustic emission characteristics of solidification and formation of casting defects in aluminum alloy 319 N92-12101
IC defect-sensitivity: Theory and computational models for yield prediction
[UDC-621.382.049.77:681.306(043)] N92-12175
Inspection of materials and structures by infrared thermography: Signal processing techniques for defect enhancement and characterization
[NRC-29717] N92-12291

DEFORMATION
High explosives skid impact initiation study
[DE90-011266] N92-12133
An astigmatic unstable resonator with an intracavity deformable mirror
[DE91-018815] N92-12257
Development of test methods for determining material deformability and yield stress, on the basis of intermetallic connections
[ETN-91-90130] N92-12303
Direct estimation of deformable motion parameters from a range image sequence
[NRC-31757] N92-12476

DEFORMETERS
Theoretical and experimental analysis of the fine mechanical behavior of a glued assembly with double slanting layers
[ETN-91-90277] N92-12068

DEGREES OF FREEDOM
On the feasibility of numerical analysis of large creep problems N92-12298

DELAMINATING
Dynamic delamination crack propagation in a graphite/epoxy laminate
[NASA-CR-187226] N92-12063
A process for preparing an assembly of an article and a soluble polyimide which resists dimensional change, delamination, and debonding when exposed to changes in temperature
[NASA-CASE-LAR-14763-1] N92-12121
An experimental and numerical study of delamination propagation and arrest in composite beams and plates when subjected to low-velocity impact N92-12299

DELTA WINGS
Nonstationary flight aerodynamics in a turbulent environment
[ETN-91-90102] N92-11980
Performance improvements and fuel cost savings due to leading edge modification of a vintage delta wing jet fighter
[FFA-TN-1991-22] N92-11993

DEMINERALIZING
Production of desalinated water using ocean thermal energy
[DE91-018894] N92-12336

DENITROGENATION
The thermodynamic properties of benzothiazole and benzoxazole
[DE91-002250] N92-12769

DENSIFICATION
Interface effects and fracture in Nicalon/SiC composites
[DE90-012925] N92-12055
DENSITY (MASS/VOLUME)
Richtmyer-Meshkov instability of shocked gaseous interfaces
[DE92-000308] N92-12225
DENSITY DISTRIBUTION
Flat planes in rarefied hypersonic flows
[SESSIA-430/91-940] N92-11979
Derivation of the high field semiconductor equations
[DE92-000249] N92-12763
The cyclotron absorption line and eclipse transition phenomena of 4U 1538-52 N92-12944
DENSITY MEASUREMENT
A novel scanning interferometer for two-dimensional plasma density measurements
[DE90-625514] N92-12697
Plasma electron density measurement with multichannel microwave interferometer on the HL-1 tokamak device
[DE91-628422] N92-12724
DEOXYGENATION
The thermodynamic properties of benzothiazole and benzoxazole
[DE91-002250] N92-12769
DEPOSITION
Laser conditioning of optical thin films
[DE90-013483] N92-12672
Structural and optical characterisation of Langmuir-Blodgett films for data storage applications N92-12780
DEPTH
Three-dimensional explicit depth migration via McClellan transformations on hexagonal sampling grids
[DE91-017370] N92-12558
DESALINIZATION
Production of desalinated water using ocean thermal energy
[DE91-018894] N92-12336
DESCRIPTIONS
Descriptor representations without direct feedthrough term
[CWI-BS-R9103] N92-12563
DESIGN ANALYSIS
Space station control center architecture N92-12016
Modifications to the rapid melt/rapid quench and transparent polymer video furnaces for the KC-135
[NASA-CR-184215] N92-12231
Improved KrF laser design for the Laboratory Microfusion Facility
[DE92-000171] N92-12259
NASA reliability preferred practices for design and test
[NASA-TM-4322] N92-12286
General introduction to engineering failure analysis
[NRC-LTR-ST-1773] N92-12288
Design of a long isotropic buffer rod
[NRC-28903] N92-12290
Reverse engineering tools for software: A small study
[DE92-000650] N92-12495
Electromagnetic loads on ITER in-vessel components
[DE92-000672] N92-12739
DESTRUCTIVE TESTS
Development of test methods for determining material deformability and yield stress, on the basis of intermetallic connections
[ETN-91-90130] N92-12303
DESULFURIZING
The thermodynamic properties of benzothiazole and benzoxazole
[DE91-002250] N92-12769
DETECTION
A high-efficiency neutron coincidence counter for small samples
[DE92-000183] N92-12639
Search for new particles in CDF
[DE92-000638] N92-12655
DETONATION
Hypervelocity explosive launchers
[DE90-011713] N92-12036
Development of a non-propagating explosives storage cabinet
[DE91-017923] N92-12148
DEUTERIDES
Hydrogen isotopic exchange over palladium metal
[DE90-012063] N92-12076
DEUTERIUM
Characteristics of an electron-beam rocket pellet accelerator
[DE92-000073] N92-12053
Deuterium on Venus: Observations from Earth N92-12879
DEUTERIUM COMPOUNDS
Evaluation of the Strecker synthesis as a source of amino acids on carbonaceous chondrites N92-12920
DEVELOPING NATIONS
A summary of the status of biomass conversion technologies and opportunities for their use in Latin America
[DE90-012284] N92-12328
DIAGNOSIS
Pattern recognition in biosignals. Application to the sigma spindles in sleep electroencephalograms
[ETN-91-90166] N92-12407
DIAPHRAGMS (MECHANICS)
Determination of diffusion coefficients in liquids using the diaphragm cell method
[DE91-018403] N92-12093
DIBORANE
A system to deposit boron films (boronization) in the D3-D tokamak
[DE92-000288] N92-12733
DIELECTRICS
Dielectric-liquid pulsed power switch
[DE90-009425] N92-12168
Electron transport in fast dielectric liquids at high applied electric fields
[DE90-009815] N92-12606
Large area laser conditioning of dielectric thin film mirrors
[DE90-013485] N92-12674
DIESEL FUELS
Environmental projects. Volume 13: Underground storage tanks, removal and replacement. Goldstone Deep Space Communications Complex
[NASA-CR-189030] N92-12035
Forecast of transportation energy demand through the year 2010
[DE92-000222] N92-12788
DIFFERENCE EQUATIONS
Difference and differential Riccati equations: A note on the convergence to the strong solution
[REPT-90-015] N92-12572
DIFFERENTIAL EQUATIONS
Constraint treatment techniques and parallel algorithms for multibody dynamic analysis N92-12297
A highly parallel multigrid-like method for the solution of the Euler equations
[NASA-CR-188816] N92-12496
A process for the calculation by approximation of the Preisach operator with usual differential equation applications
[ETN-91-90157] N92-12561
Difference and differential Riccati equations: A note on the convergence to the strong solution
[REPT-90-015] N92-12572
Differential periodic Riccati equations: A note on the existence of an infinite number of periodic strong solutions
[REPT-90-020] N92-12574
Algebraic calculation of stroboscopic maps of ordinary, nonlinear differential equations
[DE92-000220] N92-12578
DIFFERENTIAL GEOMETRY
Segmentation of complex geometric forms by the curvature method
[NRC-31210] N92-12475
DIFFUSION
Determination of diffusion coefficients in liquids using the diaphragm cell method
[DE91-018403] N92-12093
Stochastic and collisional diffusion in two-dimensional periodic flows
[DE90-014335] N92-12198
A concept for treating dense-gas dispersion under realistic conditions of terrain and variable winds
[DE90-012892] N92-12343
DIFFUSION COEFFICIENT
Determination of diffusion coefficients in liquids using the diaphragm cell method
[DE91-018403] N92-12093
DIFFUSION WELDING
The interaction of SiC with Fe, Ni, and their alloys
[ETN-91-90137] N92-12103
DIGITAL ELECTRONICS
Diagnostic reasoning techniques for selective monitoring
[NASA-CR-189446] N92-12549
DIGITAL FILTERS
Three-dimensional explicit depth migration via McClellan transformations on hexagonal sampling grids
[DE91-017370] N92-12558
DIGITAL SIMULATION
Study of hypersonic flow turbulence models
[CERT-RF-36/5005-32] N92-11971
DIGITAL SYSTEMS
Study of advanced techniques in modulation and coding for digital beam frequencies with large spectral effectiveness
[TELECOM-PARIS-90-E-020] N92-12152
DIGITAL TECHNIQUES
Study of advanced techniques in modulation and coding for digital beam frequencies with large spectral effectiveness
[TELECOM-PARIS-90-E-020] N92-12152
Identification of the mechanical behavior of solid materials
[ISBN-90-386-0041-0] N92-12304
DIMENSIONAL STABILITY
Ageing characteristics of dendritic and non-dendritic (stir-cast) Zn-Al alloy (ZA-27)
[NRC-28906] N92-12107
A process for preparing an assembly of an article and a soluble polyimide which resists dimensional change, delamination, and debonding when exposed to changes in temperature
[NASA-CASE-LAR-14763-1] N92-12121
DIODES
Cathode applications to high-current diodes
[DE90-013290] N92-12172
Linearisation of diode detectors for use in a multistate reflectometer
[NPL-DES-104] N92-12241
Three-dimensional particle-in-cell modeling of relativistic electron beam production and transport for KrF laser pumping
[DE90-013050] N92-12247
DIPOLE MOMENTS
Quantum Monte Carlo for atoms and molecules
[DE90-013793] N92-12608
DIRAC EQUATION
Bit-string scattering theory
[DE90-008013] N92-12555
DIRECT CURRENT
Principles of superconductor imaging surface gradiometry
[DE90-008916] N92-12740
The formation, structure and dissipation of direct electric current systems in the solar atmosphere N92-12979
DIRECTIVITY
A comparative analysis of XV-15 tiltrotor hover test data and WOPWOP predictions incorporating the fountain effect
[NASA-CR-189455] N92-11992
DIRECTORIES
A scalable coherent cache system with incomplete directory state
[DE90-010862] N92-12434
DISCRETE FUNCTIONS
Selected methods for the investigation of linear, continuous and discrete-continuous mechanical models of a rail
[ILR-MITT-261(1991)] N92-12277
Comments on: Stabilizability and detectability of discrete-time time-varying systems
[REPT-90-014] N92-12571
DISCRIMINANT ANALYSIS (STATISTICS)
The acoustic emission characteristics of solidification and formation of casting defects in aluminum alloy 319 N92-12101
DISPERSING
Research needs for improvement of protection against explosive or toxic industrial chemicals hazards
[FOA-C-40286-4.5] N92-12147
Anomalous dispersion in gases derived from the optical depth. Theoretical treatment: Line by line calculations
[NDRE/PUBL-91/1002] N92-12675
DISPERSIONS
Fractional crystallization in polymer mixing
[ETN-91-90184] N92-12129
DISPLACEMENT
A general nonlinear theory of large elastic deformation of layered plates N92-12296
DISPLAY DEVICES
The effect of on/off indicator design on state confusion, preference, and response time performance, executive summary
[NASA-CR-185662] N92-12416
Helmet mounted sight and display testing
[MBB-UD-0594-91-PUB] N92-12421
A fast online event display for a high intensity fixed-target spectrometer
[DE90-012047] N92-12443
Interactive digital image display and analysis system (IDIDAS) user's guide
[NOAA-TR-NESDIS-59] N92-12470
DISSOLVING
Analysis of minerals containing dissolved traces of the fluid phase components water and carbon dioxide
[NASA-CR-188993] N92-12083
DISTILLATION
Production of desalinated water using ocean thermal energy
[DE91-018894] N92-12336

DISTRIBUTED PARAMETER SYSTEMS
Robustness of feedback stabilization: A topological approach
[ETN-91-90142] N92-12545
DISTRIBUTED PROCESSING
B-2 and other current flight test control center system architectures N92-12011
Los Alamos National Laboratory's high-performance data system
[DE92-000223] N92-12442
NFS as a user interface to a high-performance data system
[DE92-000254] N92-12515
A distributed environment for testing cooperating expert systems N92-12519
DISTRIBUTION FUNCTIONS
Research in elementary particle physics
[DE90-013443] N92-12604
DIVERTERS
Magnetic field structure near the plasma boundary in helical systems and divertor tokamaks
[NIFS-17] N92-12708
DMSP SATELLITES
An atlas of monthly mean distributions of GEOSAT sea surface height, SSMI surface wind speed, AVHRR/2 sea surface temperature, and ECMWF surface wind components during 1988
[NASA-CR-189029] N92-12385
DOMAIN WALL
The formation and evolution of domain walls N92-12965
DONOR MATERIALS
Charge states of donor-hydrogen pairs in Si: A fragile balance
[DE91-018794] N92-12757
DOPPLER EFFECT
Ground-based millimeter wave Cloud Profiling Radar System (CPRS)
[DE91-018373] N92-12159
X-ray observations of SS 433 and the QSO MR 2251-178 N92-12789
Spectroscopic planetary detection N92-12808
DOSIMETERS
Microsensor research
[DE90-011801] N92-12227
Biological dosimetry: A review of methods available for determination of ionizing radiation dose
[FOA-C-40282-4.3] N92-12400
The estimation of the dose from cosmic radiation received by the population living at mainland of China
[DE91-631668] N92-12985
DRIFT RATE
Kapuskasing field study relating atmospheric stability to wind drift from aerial forest spray operations
[NRC-LTR-UA-99] N92-12372
Electron transport in fast dielectric liquids at high applied electric fields
[DE90-009815] N92-12606
DRILLING
Outer continental shelf environmental assessment program. Volume 73: Final Reports of principal investigators
[PB91-204917] N92-12382
DROP SIZE
A planar-fluorescence imaging technique for studying droplet-turbulence interactions in vaporizing sprays N92-12050
Planar laser imaging of sprays for liquid rocket studies N92-12051
DROPS (LIQUIDS)
A planar-fluorescence imaging technique for studying droplet-turbulence interactions in vaporizing sprays N92-12050
Simultaneous determination of optical and thermodynamic properties of an evaporating aqueous solution droplet
[DE90-010652] N92-12767
DUCTED FLOW
CARS temperature measurements in a hypersonic propulsion test facility N92-12049
DUCTILITY
Designing precipitation-strengthened iron-aluminides for high-temperature applications
[DE90-013832] N92-12100
Ductile-brittle transition temperature testing of tungsten using the three-point bend test
[DE92-000099] N92-12116
Synthesis of Al/Al3Ti two-phase alloys by mechanical alloying
[DE92-000193] N92-12117
DYE LASERS
The laser system of the optically pumped ion source at TRIUMF
[DE90-013102] N92-12248
DYES
Structural and optical characterisation of Langmuir-Blodgett films for data storage applications N92-12780
DYNAMIC CHARACTERISTICS
Selected methods for the investigation of linear, continuous and discrete-continuous mechanical models of a rail
[ILR-MITT-261(1991)] N92-12277
Detection of structural degradation
[DE91-016040] N92-12293
Nonlinear dynamics of optical ring resonators
[ETN-91-90173] N92-12680
DYNAMIC LOADS
Advanced study in solid transport: Rheological behavior of dense suspension
[DE90-009025] N92-12196
Numerical simulation of plasticity at high strain rate
[DE91-011403] N92-12314
DYNAMIC MODELS
On the limitations of Froude's actuator disc concept
[ETN-91-90136] N92-11973
Hierarchical controlled component synthesis of large space structures
[DE90-013476] N92-12038
Compact modeling of the dynamic behaviour of MOSFETs
[ISBN-90-9004212-1] N92-12176
Comet and asteroid dynamics N92-12857
DYNAMIC RESPONSE
An analytical and experimental study to investigate flutter suppression via piezoelectric actuation
[NASA-TM-893240] N92-12173
Semi-stochastic approximation by the Response Surface Methodology (RSM)
[ETN-91-90210] N92-12581
DYNAMIC STRUCTURAL ANALYSIS
Variable impedance journal bearings for rotor-bearing systems N92-12270
Detection of structural degradation
[DE91-016040] N92-12293
Constraint treatment techniques and parallel algorithms for multibody dynamic analysis N92-12297
Methods for improving damping. Part 1: An introduction and guide to practical methods of increasing structural damping
[ESDU-91012-PT-1] N92-12301
Large angle transient dynamics (LATDYN) documentation. Post-processor manual
[NASA-TM-104126] N92-12309
Modal interaction in linear dynamic systems near degenerate modes
[NASA-TM-105315] N92-12316
DYNAMICAL SYSTEMS
Nonlinear dynamics of optical ring resonators
[ETN-91-90173] N92-12680
DYNAMO THEORY
Manifestations of dynamo driven large-scale magnetic field in accretion disks of compact objects N92-12940

E

EARTH (PLANET)
Palomar Planet-Crossing Asteroid Survey (PCAS) January 1990 - February 1991 N92-12869
Cs-135 - Ba-135: A new cosmochronometric constraint on the origin of the Earth and the astrophysical site of the origin of the solar system N92-12915
EARTH ATMOSPHERE
The greenhouse effect and acid rain
[DE90-008347] N92-12340
Managing global climate change through international cooperation: Lessons from prior resource management efforts
[DE90-014699] N92-12350
Workshop on Artificially Ionized Layers in the Atmosphere
[DE90-013470] N92-12358
Fractionation of terrestrial neon by hydrodynamic hydrogen escape from ancient steam atmospheres N92-12931
EARTH IONOSPHERE
Workshop on Artificially Ionized Layers in the Atmosphere
[DE90-013470] N92-12358
Chemical release and radiation effects experiment advanced planned
[NASA-CR-184229] N92-12360
Combined Release and Radiation Effects Satellite (CRRES) Experiment: Educational planning and coordination
[NASA-CR-184255] N92-12362
EARTH MAGNETOSPHERE
Combined Release and Radiation Effects Satellite (CRRES) Experiment: Educational planning and coordination
[NASA-CR-184255] N92-12362
EARTH OBSERVATIONS (FROM SPACE)
Space and Earth Science Data Compression Workshop
[NASA-CP-3130] N92-12425
EARTH OBSERVING SYSTEM (EOS)
The moderate resolution imaging spectrometer: An EOS facility instrument candidate for application of data compression methods N92-12427
SAR data compression: Application, requirements, and designs N92-12428
Contents of the JPL Distributed Active Archive Center (DAAC) archive, version 2-91
[NASA-CR-189027] N92-12784
EARTH ORBITAL ENVIRONMENTS
Atomic oxygen interaction with spacecraft materials: Relationship between orbital and ground-based testing for materials certification
[NASA-TM-105449] N92-12046
ECHO SOUNDING
Design of a long isotropic buffer rod
[NRC-28903] N92-12290
ECLIPSES
Visual and infrared studies of asteroids and the Pluto-Charon system N92-12848
Studies of Triton and the Pluto-Charon system N92-12850
ECLIPSING BINARY STARS
Regular variability of the shape of the primary minimum of the orbital light curve of SS 433 with the phase of the precessional period N92-12942
The cyclotron absorption line and eclipse transition phenomena of 4U 1538-52 N92-12944
ECOLOGY
Ecological Research between the Univ. of Georgia and DOE. Volume 1: Main report
[DE90-012109] N92-12341
ECONOMIC ANALYSIS
Photovoltaics: New opportunities for utilities
[DE91-002168] N92-12334
On the vulnerability of electric power to geomagnetic storms
[DE90-013929] N92-12368
Has the European monetary system been instrumental for the convergence of inflation rates in Europe?
[REPT-90-007] N92-12787
ECONOMIC DEVELOPMENT
Survey on possibility to utilize effectively underground space
[DE92-703044] N92-12417
ECONOMICS
Has the European monetary system been instrumental for the convergence of inflation rates in Europe?
[REPT-90-007] N92-12787
ECOSYSTEMS
Ecological Research between the Univ. of Georgia and DOE. Volume 1: Main report
[DE90-012109] N92-12341
EDDY CURRENTS
Starting currents in coils with conductive permeable core, allowing for induced eddy currents
[ETN-91-90158] N92-12180
EDGE DETECTION
Segmentation of complex geometric forms by the curvature method
[NRC-31210] N92-12475
EDGE LOADING
On the limitations of Froude's actuator disc concept
[ETN-91-90136] N92-11973
EDUCATION
Adaptation of an industrial application for an instructional laboratory in mechanical vibrations
[DE90-013692] N92-12295
Combined Release and Radiation Effects Satellite (CRRES) Experiment: Educational planning and coordination
[NASA-CR-184255] N92-12362
A knowledge-based intelligent tutoring system: ACQUIRE (tm)-ITS N92-12543
EIGENVALUES
Modal interaction in linear dynamic systems near degenerate modes
[NASA-TM-105315] N92-12316
EIGENVECTORS
Application of Eigenstructure Assignment to the control of powered lift combat aircraft
[RAE-TM-FS-1009] N92-12004
EJECTION
Solar-geophysical data number 561, May 1991. Part 2: (Comprehensive reports): Data for November 1990 and miscellaneous
[PB91-217349] N92-12981

EJECTION INJURIES
Ejection systems and the human factor: A guide for flight surgeons and aeromedical trainers
[DCIEM-88-TR-16] N92-11986
EJECTION SEATS
Ejection systems and the human factor: A guide for flight surgeons and aeromedical trainers
[DCIEM-88-TR-16] N92-11986
ELASTIC DEFORMATION
Theory of inclusions in the elastic and elastic-plastic deformation of composite materials N92-12056
Three-dimensional elastodynamic modeling and analysis of a flexible robot manipulator N92-12271
A general nonlinear theory of large elastic deformation of layered plates N92-12296
ELASTIC PROPERTIES
Identification of complex modules in othotropic materials by means of free vibration analysis
[REPT-911-550-101] N92-12311
Numerical simulation of plasticity at high strain rate
[DE91-011403] N92-12314
ELASTIC SCATTERING
Theoretical nuclear physics
[DE92-000022] N92-12615
Measurement of rho, the ratio of the real to imaginary part of the (-p)p forward elastic scattering amplitude, at (radical)s = 1.8 TeV
[DE92-000155] N92-12637
ELASTIC SHELLS
Waves and fields in structural acoustics: Fluid-loaded elastic cylindrical and spherical shells N92-12597
ELASTIC WAVES
Over forty years of continuous research at UTIAS on nonstationary flows and shock waves
[UTIAS-50] N92-11974
Wave propagation and scattering in layered media: Application to ultrasonic nondestructive evaluation of interfacial cracks and earthquake ground motion N92-12285
ELASTODYNAMICS
Three-dimensional elastodynamic modeling and analysis of a flexible robot manipulator N92-12271
ELASTOPLASTICITY
Theory of inclusions in the elastic and elastic-plastic deformation of composite materials N92-12056
Study of adhesive elastoplastic glued joints
[REPT-NT-24192/AQEN] N92-12308
ELECTRIC BATTERIES
Performance evaluation of advanced battery technologies for electric vehicle applications
[DE90-013895] N92-12171
ELECTRIC CHARGE
Compact modeling of the dynamic behaviour of MOSFETs
[ISBN-90-9004212-1] N92-12176
Mobile charge and electric field distributions in abrupt PN junctions: An approach with the state variable method
[REPT-90-051] N92-12188
Local states in one-dimensional CDW (Charge Density Wave) materials: Spectral signatures for polarons and bipolarons in MX chains
[DE90-013150] N92-12605
ELECTRIC COILS
The repetitive high energy pulsed power module
[DE90-013076] N92-12164
A repetitive, one microsecond, thirty-five kilojoule, two hundred kilovolt pulse generator
[DE90-013063] N92-12167
Starting currents in coils with conductive permeable core, allowing for induced eddy currents
[ETN-91-90158] N92-12180
ELECTRIC CONTACTS
The stability of graphite brushes at high velocity
[ETN-91-90176] N92-12184
ELECTRIC CURRENT
Internal dynamics of electrical discharges
[DE90-013161] N92-12169
Starting currents in coils with conductive permeable core, allowing for induced eddy currents
[ETN-91-90158] N92-12180
Three-dimensional particle-in-cell modeling of relativistic electron beam production and transport for KrF laser pumping
[DE90-013050] N92-12247
ELECTRIC DISCHARGES
The EDM surface: Topography, chemistry, and metallurgy
[DE91-017756] N92-12110
Internal dynamics of electrical discharges
[DE90-013161] N92-12169
Sandia severe electrostatic discharge tester: Version 3 (SSET), serial number 1
[DE91-018582] N92-12243
Studies of fine structure of discharge region on HT-6B tokamak device
[DE91-628421] N92-12723
ELECTRIC EQUIPMENT TESTS
Sandia severe electrostatic discharge tester: Version 3 (SSET), serial number 1
[DE91-018582] N92-12243
ELECTRIC FIELDS
A differential charging model for synchronous satellites N92-12041
Cathode applications to high-current diodes
[DE90-013290] N92-12172
The state variable method as a unifying approach to the study of semiconductor devices
[REPT-90-045] N92-12187
Mobile charge and electric field distributions in abrupt PN junctions: An approach with the state variable method
[REPT-90-051] N92-12188
Immunological and biochemical effects of 60 Hz electric and magnetic fields in humans
[DE90-012546] N92-12402
Gridless electrostatic field solver for particle simulation codes in cylindrical geometry
[DE90-013602] N92-12445
Electron transport in fast dielectric liquids at high applied electric fields
[DE90-009815] N92-12606
ELECTRIC GENERATORS
A contribution to the identification of internal faults in electrical machines
[ETN-91-90167] N92-12183
Electricity from waste heat
[DE91-527080] N92-12331
ELECTRIC MOTOR VEHICLES
Performance evaluation of advanced battery technologies for electric vehicle applications
[DE90-013895] N92-12171
ELECTRIC POTENTIAL
Thermal effects on the Josephson series-array voltage standard
[DE90-008738] N92-12160
Mobile charge and electric field distributions in abrupt PN junctions: An approach with the state variable method
[REPT-90-051] N92-12188
Sandia severe electrostatic discharge tester: Version 3 (SSET), serial number 1
[DE91-018582] N92-12243
ELECTRIC POWER PLANTS
High-temperature corrosion of Nicalon(tm)/SiC composites
[DE92-000281] N92-12071
Strength evaluation for modified 12Cr steel and A286 steel of USC turbine rotor materials
[DE90-503033] N92-12099
Photovoltaics: New opportunities for utilities
[DE91-002168] N92-12334
Particle measurement and brine chemistry at the Salton Sea Deep Well
[DE92-000031] N92-12337
Mobile Energy Laboratory energy-efficiency testing programs
[DE92-000039] N92-12338
Decision support system development using a migration approach
[DE91-018860] N92-12774
ELECTRIC POWER SUPPLIES
Electricity from waste heat
[DE91-527080] N92-12331
Spacecraft electrical power system fault detection/diagnosis and resource management N92-12523
ELECTRIC SWITCHES
Recovery of high field GaAs photoconductive semiconductor switches
[DE90-013062] N92-12163
Dielectric-liquid pulsed power switch
[DE90-009425] N92-12168
On the theory of impulse breakdown in gases
[NRC-31510] N92-12711
ELECTRICAL ENGINEERING
Bulletin of the Division of Electrical Engineering, 1987-1988, volume 3, number 2
[NRC-29078-VOL-3-NO-2] N92-12177
ELECTRICAL FAULTS
A contribution to the identification of internal faults in electrical machines
[ETN-91-90167] N92-12183
ELECTRICAL IMPEDANCE
Cathode applications to high-current diodes
[DE90-013290] N92-12172
ELECTRICAL INSULATION
Dielectric-liquid pulsed power switch
[DE90-009425] N92-12168
Fabrication and assembly of BOLVAPS (boil-off lithium vapor source) ceramic-option half anodes
[DE90-012012] N92-12661
ELECTRICAL PROPERTIES
The behavior and testing implications of CMOS IC logic gate open circuits
[DE91-018679] N92-12189
ELECTRICAL RESISTIVITY
Internal dynamics of electrical discharges
[DE90-013161] N92-12169
ELECTRICITY
Electricity from waste heat
[DE91-527080] N92-12331
Mobile Energy Laboratory energy-efficiency testing programs
[DE92-000039] N92-12338
On the vulnerability of electric power to geomagnetic storms
[DE90-013929] N92-12368
Immunological and biochemical effects of 60 Hz electric and magnetic fields in humans
[DE90-012546] N92-12402
Immunological and biochemical effects of 60 Hz electric and magnetic fields in humans
[DE90-012547] N92-12403
ELECTROCHEMICAL CORROSION
Metallic corrosion: Causes and case histories
[NRC-LTR-ST-1798] N92-12105
ELECTROCHEMISTRY
Current programmes of Metallurgy Division, 1991
[DE91-634904] N92-12104
ELECTRODEPOSITION
Electroless vs electrodeposited Ni-P alloys for diamond turning applications
[DE91-018999] N92-12113
The role of inhibitors during electrodeposition of thin metallic films
[DE90-014177] N92-12750
ELECTROENCEPHALOGRAPHY
Pattern recognition in biosignals. Application to the sigma spindles in sleep electroencephalograms
[ETN-91-90166] N92-12407
ELECTROLESS DEPOSITION
Electroless vs electrodeposited Ni-P alloys for diamond turning applications
[DE91-018999] N92-12113
ELECTROLYSIS
Method for producing oxygen from lunar materials
[NASA-CASE-MSC-21759-1] N92-12079
ELECTROLYTIC CELLS
Determination of diffusion coefficients in liquids using the diaphragm cell method
[DE91-018403] N92-12093
ELECTROMAGNETIC ABSORPTION
Nonlinear resonant absorption and wave breaking (Vlasov simulation of resonance excited plasma waves)
[ETN-91-90172] N92-12714
ELECTROMAGNETIC FIELDS
High power impedance matchers with 100-ps risetime
[DE90-013516] N92-12150
Anomalous dispersion in gases derived from the optical depth. Theoretical treatment: Line by line calculations
[NDRE/PUBL-91/1002] N92-12675
Electromagnetic loads on ITER in-vessel components
[DE92-000672] N92-12739
ELECTROMAGNETIC INTERACTIONS
An improved model-creation program for EM interaction analysis
[NRC-31764] N92-12153
Constraint propagation through electromagnetic interaction topologies
[NRC-31761] N92-12154
Cooling of ions trapped in potential wells produced by electromagnetic radiation fields
[DE91-631104] N92-12635
Constraints placed on the Higgs sector from precision electroweak measurements
[DE92-000236] N92-12643
ELECTROMAGNETIC INTERFERENCE
Constraint propagation through electromagnetic interaction topologies
[NRC-31761] N92-12154
ELECTROMAGNETIC PULSES
Extraction apparatus with pulsed columns for monitoring dispersed phase
[DE91-017680] N92-12209
Future ESM systems and the potential for neural processing N92-12526
Simple model of the gaseous plasma and its soliton solutions
[NRC-30824] N92-12712
ELECTROMAGNETIC RADIATION
Cooling of ions trapped in potential wells produced by electromagnetic radiation fields
[DE91-631104] N92-12635

ELECTRON BEAM WELDING
Weldability of iron aluminides
[DE90-012722] N92-12096
Welding in Space Workshop
[NASA-CR-184234] N92-12269
ELECTRON BEAMS
Characteristics of an electron-beam rocket pellet accelerator
[DE92-000073] N92-12053
Electron beam irradiation of polymer blends
[ETN-91-90139] N92-12122
Physics design of the high brightness linac for the advanced free-electron laser initiative at Los Alamos
[DE92-000179] N92-12262
Even harmonic lasing
[DE92-000207] N92-12263
Gridless electrostatic field solver for particle simulation codes in cylindrical geometry
[DE90-013602] N92-12445
Ion stability in bunched electron beams
[DE90-014087] N92-12611
Recent (e,2e) studies: Laser excited atoms, autoionization, Auger processes, and thin films
[DE91-634156] N92-12614
Laser conditioning of optical thin films
[DE90-013483] N92-12672
The performance of a superconducting micro-undulator prototype
[DE90-012639] N92-12743
ELECTRON CYCLOTRON HEATING
Physics study of the application of an IFEL (Induction Free Electron Laser) to CIT (Compact Ignition Tokamak)
[DE90-011276] N92-12690
Papers presented at Seventh International Workshop on Stellarators
[DE90-625560] N92-12698
ELECTRON DENSITY (CONCENTRATION)
Cathode applications to high-current diodes
[DE90-013290] N92-12172
A novel scanning interferometer for two-dimensional plasma density measurements
[DE90-625514] N92-12697
The continuum emission of an arc plasma N92-12717
Plasma electron density measurement with multichannel microwave interferometer on the HL-1 tokamak device
[DE91-628422] N92-12724
Derivation of the high field semiconductor equations
[DE92-000249] N92-12763
ELECTRON DISTRIBUTION
Spectroscopic analysis of a discharge and a post discharge within a low pressure air stream
[ETN-91-90098] N92-12086
ELECTRON EMISSION
The continuum emission of an arc plasma N92-12717
ELECTRON ENERGY
Spectroscopic analysis of a discharge and a post discharge within a low pressure air stream
[ETN-91-90098] N92-12086
Workshop on Artificially Ionized Layers in the Atmosphere
[DE90-013470] N92-12358
Characteristic quantitites of a cascade arc used as a light source for spectroscopic techniques N92-12716
Measurement of magnetic fluctuations at small spatial scales in the Tokapole 2 tokamak
[DE92-000161] N92-12728
The multipulse Thomson scattering diagnostic on the D3-D tokamak
[DE92-000262] N92-12732
ELECTRON GUNS
Characteristics of an electron-beam rocket pellet accelerator
[DE92-000073] N92-12053
ELECTRON MICROSCOPY
The composition of meteoroids impacting LDEF N92-12910
Transmission electron microscopy of an interplanetary dust particle with links to CI chondrites N92-12919
Carbonate and sulfate minerals in the Chassigny meteorite N92-12930
Mineralogy and matrix composition of CR chondrites Renazzo and EET 87770, and ungrouped chondrites Essebi and MAC 87300 N92-12932
ELECTRON MOBILITY
Electron transport in fast dielectric liquids at high applied electric fields
[DE90-009815] N92-12606
Derivation of the high field semiconductor equations
[DE92-000249] N92-12763
ELECTRON PLASMA
Plasma electron density measurement with multichannel microwave interferometer on the HL-1 tokamak device
[DE91-628422] N92-12724
On two-dimensional relativistic stellar winds N92-12947
ELECTRON SCATTERING
Application of parallel computing to the Monte Carlo simulation of electron scattering in solids: A rapid method for profile deconvolution
[DE90-009322] N92-12072
ELECTRON SPECTROSCOPY
Recent (e,2e) studies: Laser excited atoms, autoionization, Auger processes, and thin films
[DE91-634156] N92-12614
Characteristic quantitites of a cascade arc used as a light source for spectroscopic techniques N92-12716
Imaging analysis of LDEF craters N92-12927
ELECTRON SPIN
Phase diagram of anisotropic two-dimensional quarter-filled band of interacting electrons
[DE90-013171] N92-12748
ELECTRON STATES
Laser studies of the photodissociation dynamics of cometary radicals N92-12823
ELECTRON TRANSFER
Electron transport in fast dielectric liquids at high applied electric fields
[DE90-009815] N92-12606
Theory of exotic superconducting and normal states of heavy electron and high T(sub c) materials
[DE90-012688] N92-12745
ELECTRON TRANSITIONS
Semiclassical calculation of the vibrational structure of the (B) 1B(sub u) Rydberg state of trans-di-imide from ab initio CI potential energy surfaces N92-12629
ELECTRONIC EQUIPMENT
Machine Intelligence for Aerospace Electronic Systems
[AGARD-CP-499] N92-12517
A research program in experimental high energy physics
[DE90-013321] N92-12659
ELECTRONIC EQUIPMENT TESTS
Study and development of a pressure and acceleration sensor using a piezoelectric polymer (PVDF)
[LAAS-91154] N92-12237
Diagnostic reasoning techniques for selective monitoring
[NASA-CR-189446] N92-12549
ELECTRONIC SPECTRA
Novel approaches to the calculation of the electronic structure and dynamics of excited states: Application to trans-di-imide and ethylene
[ETN-91-90309] N92-12628
CEPA-type size consistency corrections for MRSDCI calculations, MRCEPA N92-12631
ELECTRONIC TRANSDUCERS
Study of interactions on anemoclinometric sensors
[REPT-90/30] N92-12006
A Linear Variable Differential Transfer (LVDT) conditioner for the bundle profile monitor of AmPS
[DIGEL-1991-1] N92-12178
Study and development of a pressure and acceleration sensor using a piezoelectric polymer (PVDF)
[LAAS-91154] N92-12237
ELECTRONS
A differential charging model for synchronous satellites N92-12041
Electron transport in fast dielectric liquids at high applied electric fields
[DE90-009815] N92-12606
Laboratory simulation of the surface of Halley's Comet N92-12872
ELECTROPLATING
Gold sulfide replacements of cyanide solutions
[DE91-017981] N92-12111
ELECTROSTATIC WAVES
Generation of auroral kilometric radiation in upper hybrid wave-lower hybrid soliton interaction
[MPE-PREPRINT-202] N92-12364
ELECTROSTATICS
Sandia severe electrostatic discharge tester: Version 3 (SSET), serial number 1
[DE91-018582] N92-12243
ELEMENTARY EXCITATIONS
Quasi particles and fermi surfaces of heavy fermion systems
[ETN-91-90180] N92-12619
ELEMENTARY PARTICLE INTERACTIONS
Topics in gauge theories and the unification of elementary particle interactions
[DE90-013435] N92-12603
A research program in experimental high energy physics
[DE90-013321] N92-12659
Large Hadron Collider Workshop. Volume 2: Proceedings
[DE91-634595] N92-12663
ELEMENTARY PARTICLES
Research in elementary particle physics
[DE90-013443] N92-12604
A research program in experimental high energy physics
[DE90-013321] N92-12659
Large Hadron Collider Workshop. Volume 2: Proceedings
[DE91-634595] N92-12663
Physical interpretation of supercoherent states and their associated Grassmann numbers
[DE92-000187] N92-12770
ELLIPSOMETERS
Infrared and ultraviolet spectroscopic ellipsometry using a cascaded arc as light source N92-12719
The a-Si:H films produced by an expanding argon-silane plasma investigated with spectroscopic infrared ellipsometry N92-12721
ELLIPTICAL GALAXIES
The peculiar velocity field predicted from the distribution of IRAS galaxies N92-12969
EMBEDDED COMPUTER SYSTEMS
The data oriented requirements implementation scheme N92-12460
A practical experience of Ada for developing embedded software N92-12465
Development and verification of software for flight safety critical systems N92-12469
EMBEDDING
Embedding as a tool for language comparison
[CWI-CS-R9102] N92-12483
EMISSION
Priority pollutant analysis of MHD-derived combustion products
[DE90-012630] N92-12689
Gas flow and generation of x ray emission in WR+OB binaries N92-12972
EMISSION SPECTRA
Kinematic measurement of alpha particles accompanied by spontaneous fission of Cf-252
[ETN-91-90175] N92-12618
Ground-based observations of comets, the Jupiter plasma Torus, and Io N92-12840
Detection of CN emission from (2060) Chiron N92-12860
X ray emission from active galactic nuclei N92-12962
On the observational appearances of a freely precessing neutron star in Hercules X-1 N92-12963
EMISSIVITY
Error analysis by numerical simulation for a three-color pyrometer assuming a blackbody spectrum and a wavelength and temperature dependent emissivity
[DE90-011504] N92-12230
The VUV emissivity of a high pressure cascade argon arc from 125 to 200 nm N92-12718
EMITTANCE
Nonthermal synchrotron pair cascades in strong magnetic fields: A gamma ray burst emission model N92-12899
END EFFECTORS
A unified motion planning approach for redundant and non-redundant manipulators with actuator constraints
[NASA-CR-189002] N92-12274
A unified motion planning approach for redundant and non-redundant manipulators with actuator constraints
[NASA-CR-189023] N92-12276
ENERGETIC PARTICLES
Finite orbit energetic particle linear response to toroidal Alfven Eigenmodes
[DE91-018418] N92-12612
ENERGY ABSORPTION
Determination of the contact forces between a projectile and a hard target
[DE91-018354] N92-12281
ENERGY CONSERVATION
Mobile Energy Laboratory energy-efficiency testing programs
[DE92-000039] N92-12338
The potential impact of conservation and alternative energy sources on carbon dioxide emissions
[DE90-008346] N92-12339
Forecast of transportation energy demand through the year 2010
[DE92-000222] N92-12788
Generation of ultrahigh-energy gamma rays in accreting x ray pulsars N92-12950
ENERGY CONVERSION
Ocean energy contract list, fiscal year 1990
[DE91-002177] N92-12333
Thulium heat source for high-endurance and high-energy density power systems
[DE91-018991] N92-12666
ENERGY CONVERSION EFFICIENCY
Trends in dish-Stirling solar receiver designs
[DE90-011507] N92-12324

Research on stable, high-efficiency, amorphous silicon multijunction modules
[DE91-015002] N92-12335
Mobile Energy Laboratory energy-efficiency testing programs
[DE92-000039] N92-12338
Catalysis and biocatalysis program
[NASA-CR-189452] N92-12392

ENERGY DISSIPATION
Adaptation of an industrial application for an instructional laboratory in mechanical vibrations
[DE90-013692] N92-12295

ENERGY POLICY
A plan for the study of the costs and environmental impact of fusion compared with alternative energy sources
[DE90-013068] N92-12696

ENERGY SPECTRA
Interpretation of ion energy spectra of laser plasmas, by recombination model
[ETN-91-90170] N92-12713
Cosmic gamma-ray bursts N92-12954

ENERGY STORAGE
Survey on possibility to utilize effectively underground space
[DE92-703044] N92-12417

ENERGY TECHNOLOGY
A PC-based telemetry system for acquiring and reducing data from multiple PCM streams
[DE91-002199] N92-12037
Basic energy sciences: Summary of accomplishments
[DE90-011269] N92-12327
Ocean energy contract list, fiscal year 1990
[DE91-002177] N92-12333
The potential impact of conservation and alternative energy sources on carbon dioxide emissions
[DE90-008346] N92-12339
Division of Energy Biosciences: Summaries of FY 1991 activities
[DE92-000518] N92-12401
A plan for the study of the costs and environmental impact of fusion compared with alternative energy sources
[DE90-013068] N92-12696
Results and the future of research, part 2
[DE90-503494] N92-12987

ENERGY TRANSFER
Implementation of a modified Johnson and Hindmarsh mass and energy model
[DE90-000488] N92-12329
Cloud parameterization for climate models
[DE90-014344] N92-12369
Energy models for one-carrier transport in semiconductor devices
[NASA-CR-189046] N92-12557
Reflectometry and transport in thermonuclear plasmas in the joint European Torus
[ETN-91-90135] N92-12709
Influence of wave-particle interactions on solar flare dynamics N92-12978

ENGINE CONTROL
Software methodologies for safety critical systems N92-12467

ENGINE PARTS
Composite load spectra for select space propulsion structural components
[NASA-CR-189048] N92-12306

ENGINE TESTS
Humidity effects on gas turbine performance
[NRC-30241] N92-11998
Fuel flow measurement in gas turbine testing
[NRC-29808] N92-12000
A derivation of gross thrust for a sea-level jet engine test cell
[NRC-30165] N92-12001

ENRICHMENT
Rangeland-plant response to elevated CO2
[DE90-013702] N92-12387

ENSTATITE
Distribution of silicon between kamacite and taenite N92-12911
Dynamic crystallization characteristics of enstatite chondrite chondrules N92-12923

ENTHALPY
COMMIX-1AR/P: A three-dimensional transient single-phase computer program for thermal hydraulic analysis of single and multicomponent systems
[DE91-018703] N92-12222

ENVIRONMENT EFFECTS
Ecological Research between the Univ. of Georgia and DOE. Volume 1: Main report
[DE90-012109] N92-12341
Managing global climate change through international cooperation: Lessons from prior resource management efforts
[DE90-014699] N92-12350
Processes for identifying regional influences of and responses to increasing atmospheric CO2 and climate change: The MINK project
[DE91-018607] N92-12354
Processes for identifying regional influences of and responses to increasing atmospheric CO2 and climate change: The MINK project
[DE91-018608] N92-12355
Rangeland-plant response to elevated CO2
[DE90-013702] N92-12387
A plan for the study of the costs and environmental impact of fusion compared with alternative energy sources
[DE90-013068] N92-12696

ENVIRONMENT SIMULATION
Atomic oxygen interaction with spacecraft materials: Relationship between orbital and ground-based testing for materials certification
[NASA-TM-105449] N92-12046

ENVIRONMENTAL MONITORING
Pulsed laser fluorometry for environmental monitoring
[DE90-013163] N92-12249
Climate Monitoring and Diagnostics Laboratory no. 18
[PB91-205559] N92-12371

ENVIRONMENTAL SURVEYS
Outer continental shelf environmental assessment program. Volume 73: Final Reports of principal investigators
[PB91-204917] N92-12382

EPHEMERIDES
Comet and asteroid dynamics N92-12857
Radar studies in the solar system N92-12886

EPIDEMIOLOGY
When is a dose not a dose?
[DE92-000132] N92-12409
Data management in heterogeneous environments and its implications to CEDR
[DE92-000651] N92-12785

EPITAXY
Properties of epitaxial YBa2Cu3O(7-delta)-based superconducting superlattices
[DE92-000423] N92-12765
Laser ablation synthesis and properties of epitaxial YBa2Cu3O(7-delta) / PrBa2Cu3O(7-delta) superconducting superlattices
[DE92-000447] N92-12766

EPOXY MATRIX COMPOSITES
Influences of expanding monomer on carbon fiber reinforced epoxy composites 2
[AD-A240583] N92-12057
Improved specimen support jig for hot-wet compression testing
[NRC-LTR-ST-1790] N92-12059

EPOXY RESINS
Influences of expanding monomer on carbon fiber reinforced epoxy composites 2
[AD-A240583] N92-12057
A damage tolerance assessment of bonded repairs to CF-18 composite components. Part 1: Adhesive properties
[DREP-TM-88-25-PT-1] N92-12060
Modelling the cure of Narmco 5208: A method for determining the chemical state of the prepreg
[NRC-29449] N92-12126

EQUATIONS OF STATE
Excess mixing volumes and specific interactions in organic molecule mixing
[ETN-91-90171] N92-12616
A simple model for localized-itinerant magnetic systems: Crystal field effects
[DE90-625399] N92-12746

ERROR ANALYSIS
Tracking performance requirements for rotorcraft instrument approaches to reduced minima. Phase 1: Preliminary study
[NRC-32137-PHASE-1] N92-11988
Error analysis of a ratio pyrometer by numerical simulation
[DE90-011500] N92-12229
Error analysis by numerical simulation for a three-color pyrometer assuming a blackbody spectrum and a wavelength and temperature dependent emissivity
[DE90-011504] N92-12230
Method of recertifying a loaded bearing member
[NASA-CASE-LAR-14168-1] N92-12302
Data compression: The end-to-end information systems perspective for NASA space science missions N92-12426
Techniques for containing error propagation in compression/decompression schemes N92-12433
Authentication of byte sequences
[DE92-000150] N92-12492
Algebraic error analysis for surface curvatures of 3-D range images
[NRC-30297] N92-12559
A two-grid analysis of the combination of mixed finite elements and Vanka-type relaxation
[CWI-NM-R9102] N92-12566
A minimum prediction error algorithm for estimation of periodic ARMA models
[REPT-90-016] N92-12573

ERROR CORRECTING CODES
A system for calibrating the wrist-mounted laser range finder
[NRC-29799] N92-12252

ETHYLENE
Vapour pressures and critical points of liquids. Halogenated ethylenes
[ESDU-91006] N92-12081
CEPA-type size consistency corrections for MRSDCI calculations, MRCEPA N92-12631
Three-dimensional quantum calculations on the ground and excited state vibrations of ethylene N92-12632
Ethylene line emission from the North Pole of Jupiter N92-12876

EULER EQUATIONS OF MOTION
Three-dimensional elastodynamic modeling and analysis of a flexible robot manipulator N92-12271
A highly parallel multigrid-like method for the solution of the Euler equations
[NASA-CR-188816] N92-12496
Vectorization and parallelization of the AEROLOG3D code in collaboration with Matra
[ONERA-RF-37/3479-CY] N92-12508
Efficient multi-dimensional upwinding for the steady Euler equations
[CWI-NM-R9107] N92-12570
The ODE formulation of hyperbolic PDE's discretized by the spectral collocation method
[FFI-91/7011] N92-12576

EULER-LAGRANGE EQUATION
Lagrangian analysis, data covariance, and the impulse time integral
[DE92-000169] N92-12224
Three-dimensional elastodynamic modeling and analysis of a flexible robot manipulator N92-12271

EUROPA
Infrared speckle interferometry and spectroscopy of Io N92-12820
Infrared speckle interferometry and spectroscopy of Io N92-12870

EUROPE
Has the European monetary system been instrumental for the convergence of inflation rates in Europe?
[REPT-90-007] N92-12787

EUROPEAN COMMUNICATIONS SATELLITE
ECS: Seventh year in orbit
[ESA-BR-74] N92-12009

EVALUATION
The modelling of turbulence and downbursts for flight simulators
[UTIAS-339] N92-12373

EVAPORATION
Cloud parameterization for climate models
[DE90-014344] N92-12369
Laser conditioning of optical thin films
[DE90-013483] N92-12672
Simultaneous determination of optical and thermodynamic properties of an evaporating aqueous solution droplet
[DE90-010652] N92-12767

EVAPORATORS
Production of desalinated water using ocean thermal energy
[DE91-018894] N92-12336

EVAPOTRANSPIRATION
Estimation of surface heat and moisture fluxes over a prairie grassland using a hybrid biosphere/remote sensing model N92-12320

EVOLUTION (DEVELOPMENT)
Vorticity dynamics of inviscid shear layers
[NASA-CR-189042] N92-12212
Observational evidence of aging processes in comets N92-12833

EXCIMER LASERS
Laserable KrF(*)-excimer discharge with integrated preionization
[ETN-91-90177] N92-12253

EXCITATION
Recent (e,2e) studies: Laser excited atoms, autoionization, Auger processes, and thin films
[DE91-634156] N92-12614
Examination of excitation and decay of giant resonances in Ca-40 by (e,e'x) coincidence experiments
[ETN-91-90174] N92-12617
Three-dimensional quantum calculations on the ground and excited state vibrations of ethylene N92-12632
Superdeformed nuclei
[DE92-000269] N92-12647

Optical properties of MX chain materials: An extended Peierls-Hubbard model
[DE92-000314] N92-12764

EXHAUST EMISSION
Monitoring IACP samples and construction of a centralized database
[PB91-213546] N92-12351

EXHAUST GASES
Single-column ion chromatography of passive monitors for atmospheric pollution
[NRC-28893] N92-12352

EXOBIOLOGY
Life sciences report 1987
[NASA-TM-105105] N92-12388
Aerospace medicine and biology: A continuing bibliography with indexes (supplement 354)
[NASA-SP-7011(354)] N92-12404
Aerospace medicine and biology: A continuing bibliography with indexes (supplement 355)
[NASA-SP-7011(355)] N92-12412

EXOSPHERE
Observational studies of the exospheres of the Moon and Mercury N92-12839

EXPERIMENT DESIGN
Goldstone solar system radar N92-12824

EXPERT SYSTEMS
Real Time Data System (RTDS) N92-12019
Planning systems for pioneer mission control N92-12021
Automation for deep space vehicle monitoring N92-12022
Automating a spacecraft electrical power system using expert systems
[NASA-TP-3161] N92-12052
The development of a requirement specification for an experimental active flight control system for a variable stability helicopter: An Ada simulation in JSD N92-12466
Enhanced use of CLIPS at the Los Alamos National Laboratory
[DE92-000305] N92-12493
A distributed environment for testing cooperating expert systems N92-12519
Heuristic route optimization: A model for force level route planning N92-12520
Advanced Satellite Workstation (ASW) N92-12521
Spacecraft electrical power system fault detection/diagnosis and resource management N92-12523
TACAID: A knowledge based system for tactical decision making N92-12524
A NASA/RAE cooperation in the development of a real-time knowledge based autopilot N92-12528
Pilot's associate: Evolution of a functional prototype N92-12531
Expert system for the Tornado ground-based check-out system N92-12536
Using AITEST to troubleshoot a Radar Modulator (RM) unit: A case study in the application of expert systems to intermediate-level testing N92-12537
A knowledge-based assistant for diagnosis in aircraft maintenance N92-12538
Integrated Communications, Navigation, Identification, Avionics (ICNIA) expert system for fault tolerant avionics N92-12539
C3I graphical applications N92-12541
Engineering Graphical Analysis Tool (EGAT) development program N92-12542
A knowledge-based intelligent tutoring system: ACQUIRE (tm)-ITS N92-12543
Reasoning with uncertain and incomplete information in aerospace applications N92-12544
On finding minimum-diameter clique trees
[DE92-000386] N92-12579
A distributed agent architecture for real-time knowledge-based systems: Real-time expert systems project, phase 1
[NASA-CR-188947] N92-12781
Practical implications of theories of uncertainty for uncertainty elicitation
[DE91-017949] N92-12782
An overview of realtime expert systems
[NRC-31759] N92-12783

EXPLORER SATELLITES
Observing SN 1987A with the International Ultraviolet Explorer N92-12957

EXPLOSIONS
Centaur in-tank explosion flow fields within STS and Titan 4 payload spaces
[NASA-CR-189039] N92-12144
Hydrodynamic study of Supernova 1987A: The phase of a wave of cooling and recombination N92-12973

EXPLOSIVES
Hypervelocity explosive launchers
[DE90-011713] N92-12036
Chemical analysis of trace substances from explosives
[DE91-017833] N92-12084
High explosives skid impact initiation study
[DE90-011266] N92-12133
Development of a non-propagating explosives storage cabinet
[DE91-017923] N92-12148

EXTENSOMETERS
Theoretical and experimental analysis of the fine mechanical behavior of a glued assembly with double slanting layers
[ETN-91-90277] N92-12068

EXTRACTION
Extraction apparatus with pulsed columns for monitoring dispersed phase
[DE91-017680] N92-12209

EXTRAPOLATION
Vapour pressures and critical points of liquids. Halogenated ethylenes
[ESDU-91006] N92-12081
Three-dimensional explicit depth migration via McClellan transformations on hexagonal sampling grids
[DE91-017370] N92-12558

EXTRASOLAR PLANETS
Spectroscopic planetary detection N92-12808
The radial velocity search for extrasolar planets N92-12832

EXTRATERRESTRIAL ENVIRONMENTS
Welding in Space Workshop
[NASA-CR-184234] N92-12269

F

FABRICATION
Current programmes of Metallurgy Division, 1991
[DE91-634904] N92-12104
Progress with the slotted-tube pulsed microwiggler
[DE92-000173] N92-12260
Using computer experiments to construct a cheap substitute for an expensive simulation model --- application to a compression molding process
[DE92-000421] N92-12494
Laser ablation synthesis and properties of epitaxial YBa2Cu3O(7-delta) / PrBa2Cu3O(7-delta) superconducting superlattices
[DE92-000447] N92-12766

FABRY-PEROT INTERFEROMETERS
The MPE/UCB far-infrared imaging Fabry-Perot interferometer (FIFI)
[NASA-CR-185495] N92-12242

FACTORIZATION
Spectral factorization of linear periodic systems with application to the optimal prediction of periodic ARMA models
[REPT-90-013] N92-12768

FAILURE
Uncertainty analysis report for Ulysses, volume 1
[DE91-013476] N92-12039
A method for multiaxial fatigue life prediction using energy approaches
[DE91-018851] N92-12315

FAILURE ANALYSIS
Safety Evaluation Report for Ulysses, volume 1
[DE91-013473] N92-12047
Dynamic delamination crack propagation in a graphite/epoxy laminate
[NASA-CR-187226] N92-12063
Acoustic emission applied to composite material structures
[REPT-911-430-138] N92-12067
Cryogenic testing of fluoropolymer-coated stainless steel tubing
[DE90-008022] N92-12098
The effect of casting temperature on the fatigue properties of cast nickel aluminide alloys
[DE92-000432] N92-12118
On the formation of a joint during cold welding
[DE91-017672] N92-12275
Failure analysis of turbine blades
[DE91-631513] N92-12282
General introduction to engineering failure analysis
[NRC-LTR-ST-1773] N92-12288
Detection of structural degradation
[DE91-016040] N92-12293
A feasibility study of using ABAQUS finite element analysis for creep with microstructural material damage
[NRC-LTR-ST-1791] N92-12305
Spacecraft electrical power system fault detection/diagnosis and resource management N92-12523
Constrained receding-horizon predictive control
[REPT-90-062] N92-12551

FAILURE MODES
Safety Evaluation Report for Ulysses, volume 1
[DE91-013473] N92-12047
A process for preparing an assembly of an article and a soluble polyimide which resists dimensional change, delamination, and debonding when exposed to changes in temperature
[NASA-CASE-LAR-14763-1] N92-12121
General introduction to engineering failure analysis
[NRC-LTR-ST-1773] N92-12288
An experimental and numerical study of delamination propagation and arrest in composite beams and plates when subjected to low-velocity impact N92-12299

FAINT OBJECTS
Astrometric observations of comets and minor planets N92-12894

FALLOUT
The total defence radiation protection organization. A study of its capability
[FOA-C-40285-4.3] N92-12773

FAR INFRARED RADIATION
The MPE/UCB far-infrared imaging Fabry-Perot interferometer (FIFI)
[NASA-CR-185495] N92-12242
The far infrared optical constants of some common polymers
[NPL-DES-111] N92-12682

FAR ULTRAVIOLET RADIATION
Method and apparatus for producing a photopumped VUV laser in Mo(6+) ion-containing plasma
[AD-D014961] N92-12250
The VUV emissivity of a high pressure cascade argon arc from 125 to 200 nm N92-12718

FATIGUE (MATERIALS)
The EDM surface: Topography, chemistry, and metallurgy
[DE91-017756] N92-12110
A method for multiaxial fatigue life prediction using energy approaches
[DE91-018851] N92-12315

FATIGUE LIFE
A review of aeronautical fatigue investigations in Sweden during the period May 1989 to April 1991
[FFA-TN-1991-24] N92-12313
A method for multiaxial fatigue life prediction using energy approaches
[DE91-018851] N92-12315

FATIGUE TESTS
Tutor aft fuselage and empennage full-scale fatigue test: Resolution of horizontal stabilizer installation difficulties
[NRC-LTR-ST-1804] N92-11990
Fatigue crack propagation rates of experimental aluminum lithium sheet and plate alloys
[ESDU-91015] N92-12102
A review of aeronautical fatigue investigations in Sweden during the period May 1989 to April 1991
[FFA-TN-1991-24] N92-12313

FAULT TOLERANCE
Mission critical technology development N92-12031
An independent review of the Multi-Path Redundant Avionics Suite (MPRAS) architecture assessment and characterization report
[NASA-CR-188126] N92-12440
Integrated Communications, Navigation, Identification, Avionics (ICNIA) expert system for fault tolerant avionics N92-12539

FEASIBILITY ANALYSIS
Error analysis of a ratio pyrometer by numerical simulation
[DE90-011500] N92-12229
A feasibility study of using ABAQUS finite element analysis for creep with microstructural material damage
[NRC-LTR-ST-1791] N92-12305
Common Ada Missile Packages (CAMP) N92-12468
A knowledge-based assistant for diagnosis in aircraft maintenance N92-12538

FEEDBACK
General pole structure assignment in singular systems
[MATHS-REPT-A-147] N92-12554

FEEDBACK CONTROL
Air-breathing hypersonic vehicle guidance and control studies; An integrated trajectory/control analysis methodology: Phase 1
[NASA-CR-187623] N92-12002
An analytical and experimental study to investigate flutter suppression via piezoelectric actuation
[NASA-TM-893240] N92-12173
Stiffness control of teleoperators with redundant, dissimilar kinematics
[DE90-011642] N92-12265
Integration of model-based and sensor-based control for a two-link flexible robot arm
[DE90-012183] N92-12266
Code generation for fast DSP-based real-time control N92-12462
Constrained receding-horizon predictive control
[REPT-90-062] N92-12551
General pole structure assignment in singular systems
[MATHS-REPT-A-147] N92-12554

FELDSPARS
The origin of amorphous rims on lunar plagioclase grains: Solar wind damage or vapor condensates N92-12918
FERMENTATION
Division of Energy Biosciences: Summaries of FY 1991 activities
[DE92-000518] N92-12401
FERMI LIQUIDS
Quasi particles and fermi surfaces of heavy fermion systems
[ETN-91-90180] N92-12619
FERMI SURFACES
Quasi particles and fermi surfaces of heavy fermion systems
[ETN-91-90180] N92-12619
FERMIONS
Quasi particles and fermi surfaces of heavy fermion systems
[ETN-91-90180] N92-12619
Pressure dependence of the specific heat of heavy-fermion YbCu4.5
[DE90-011584] N92-12742
FERROMAGNETIC MATERIALS
Channel cooling-techniques for repetitively pulsed magnetic switches
[DE90-013077] N92-12165
FIBER COMPOSITES
Theory of inclusions in the elastic and elastic-plastic deformation of composite materials N92-12056
Tensile properties of injection molded long fiber thermoplastic composites
[NRC-29456] N92-12062
FIBER OPTICS
Stimulated Raman scattering in optical fibers: Polychromatic single-field numerical experiments
[DE90-012894] N92-12671
FIBER ORIENTATION
Tensile properties of injection molded long fiber thermoplastic composites
[NRC-29456] N92-12062
FIELD ALIGNED CURRENTS
The formation, structure and dissipation of direct electric current systems in the solar atmosphere N92-12979
FIELD COILS
An algorithm for determining EF coils from fixed-boundary equilibria applied to ARIES 3
[DE92-000170] N92-12730
FIELD EFFECT TRANSISTORS
Compact modeling of the dynamic behaviour of MOSFETs
[ISBN-90-9004212-1] N92-12176
V.DMOS transistor modeling for simulation of power electronic circuits
[LAAS-91711] N92-12179
Optimal realization of multistage cascade circuits
[ETN-91-90165] N92-12182
Microsensor research
[DE90-011801] N92-12227
FIELD THEORY (PHYSICS)
Neural network solutions to mathematical models of parallel search for optimal trajectory generation N92-12527
The riddle of high-energy baryon number violation
[DE92-000253] N92-12644
Monte Carlo approaches to effective field theories
[DE92-000198] N92-12771
FIGHTER AIRCRAFT
Application of Eigenstructure Assignment to the control of powered lift combat aircraft
[RAE-TM-FS-1009] N92-12004
Tool supported software development experiences from the EFA project N92-12451
TACAID: A knowledge based system for tactical decision making N92-12524
Development of tactical decision aids N92-12532
Integrating machine intelligence into the cockpit to aid the pilot N92-12533
FILM BOILING
Fabrication and assembly of BOLVAPS (boil-off lithium vapor source) ceramic-option half anodes
[DE90-012012] N92-12661
FILM COOLING
Effects of wake and shock passing on the heat transfer to a film cooled transonic turbine blade N92-12201
FINANCE
Control mechanisms in Italian business groups
[REPT-90-014] N92-12775
The stock exchange market and company groups
[REPT-90-015] N92-12776
The organization of an options market: Case of the European options market
[REPT-90-016] N92-12777
FINE STRUCTURE
Studies of fine structure of discharge region on HT-6B tokamak device
[DE91-628421] N92-12723
Influence of wave-particle interactions on solar flare dynamics N92-12978
FINITE DIFFERENCE THEORY
Numerical solution of incompressible Navier-Stokes equations using a velocity-vorticity formulation N92-12205
Turbulent boundary layer solution for two-dimensional compressible flow using mixing length and K-epsilon turbulence models
[AD-A233771] N92-12213
Time delay and finite differences for the nonstationary nonlinear Navier-Stokes equations
[PREPRINT-1359] N92-12218
Variable impedance journal bearings for rotor-bearing systems N92-12270
The stability of numerical boundary treatments for compact high-order finite-difference schemes
[NASA-CR-187628] N92-12556
A three-dimensional model for molecular cloud collapse and protostellar formation N92-12898
FINITE ELEMENT METHOD
Numerical verification of NISA 2 finite element analysis of the cracked 5th stage compressor disc of J-85 jet engine
[NRC-LTR-ST-1792] N92-11997
Numerical solution of incompressible Navier-Stokes equations using a velocity-vorticity formulation N92-12205
On the feasibility of numerical analysis of large creep problems N92-12298
Identification of the mechanical behavior of solid materials
[ISBN-90-386-0041-0] N92-12304
A feasibility study of using ABAQUS finite element analysis for creep with microstructural material damage
[NRC-LTR-ST-1791] N92-12305
A research program in finite element analysis and iterative solution on advanced processors
[DE90-013958] N92-12446
Generalized finite element gap model
[AD-A240559] N92-12471
Three-dimensional explicit depth migration via McClellan transformations on hexagonal sampling grids
[DE91-017370] N92-12558
A two-grid analysis of the combination of mixed finite elements and Vanka-type relaxation
[CWI-NM-R9102] N92-12566
FINITE VOLUME METHOD
Numerical solution of incompressible Navier-Stokes equations using a velocity-vorticity formulation N92-12205
FINS
Effect of twin fins on isolated tailplane lift-curve slope
[ESDU-91009] N92-11969
FIXTURES
Maintaining optimum light output with a thermally conductive heat pipe
[DE90-012423] N92-12195
FLAME STABILITY
An experimental analysis of lateral jet injection into confined swirling crossflows N92-12199
FLASH LAMPS
Dielectric-liquid pulsed power switch
[DE90-009425] N92-12168
Flashlamp pumping of Nd:glass disk amplifiers
[DE90-013482] N92-12703
FLAT PLATES
An assessment and application of turbulence models for hypersonic flows
[NASA-TM-105124] N92-11984
FLEXIBILITY
Mechanical properties and microstructure of pressureless sintered duophase sialon
[DE92-000043] N92-12131
Variable impedance journal bearings for rotor-bearing systems N92-12270
FLEXIBLE BODIES
Hierarchical controlled component synthesis of large space structures
[DE90-013476] N92-12038
Three-dimensional elastodynamic modeling and analysis of a flexible robot manipulator N92-12271
FLEXIBLE WINGS
Investigation of the aeroelastic stability of the AFW wind-tunnel model using CAP-TSD
[NASA-TM-104142] N92-11977
FLIGHT CLOTHING
Evaluation of the Aerazur multifunctional flight suit in centrifugal tests
[REPT-38/CEV/SE/LAMAS] N92-12419
FLIGHT CONTROL
Control Center Technology Conference Proceedings
[NASA-CP-10081] N92-12010
Space shuttle Mission Control Center upgrade N92-12015
Real Time Data System (RTDS) N92-12025
A methodology for software specification and development based on simulation N92-12458
Process/object-oriented Ada software design for an experimental helicopter N92-12461
The development of a requirement specification for an experimental active flight control system for a variable stability helicopter: An Ada simulation in JSD N92-12466
Development and verification of software for flight safety critical systems N92-12469
FLIGHT OPERATIONS
SHARP: Spacecraft Health Automated Reasoning Prototype N92-12020
Planning systems for pioneer mission control N92-12021
MTFF operations
[MBB-UO-0075-91-PUB] N92-12043
Flight Research Laboratory T-33 microgravity facility flight operations, 1986 to 1990
[NRC-32136] N92-12142
FLIGHT OPTIMIZATION
Practical input optimization for aircraft parameter estimation experiments N92-11989
FLIGHT PATHS
Air-breathing hypersonic vehicle guidance and control studies; An integrated trajectory/control analysis methodology: Phase 1
[NASA-CR-187623] N92-12002
AI for RPVs, Sensor Driven Airborne Replanner (SDAR), for a Robotic Aircraft Sensor Platform (RASP) N92-12534
FLIGHT SAFETY
Development and verification of software for flight safety critical systems N92-12469
FLIGHT SIMULATION
NASA Ames-Dryden integrated test facility: Presentation outline N92-12014
Ames life science telescience testbed evaluation
[NASA-CR-188856] N92-12033
FLIGHT SIMULATORS
The modelling of turbulence and downbursts for flight simulators
[UTIAS-339] N92-12373
FLIGHT TESTS
Practical input optimization for aircraft parameter estimation experiments N92-11989
Development of a pneumatic high-angle-of-attack flush airdata sensing (HI-FADS) system
[NASA-TM-104241] N92-11994
Resonance and control response tests using a control stimulation drive
[MBB-UD-0586-90-PUB] N92-12003
B-2 and other current flight test control center system architectures N92-12011
Analyst workbench N92-12464
AI for RPVs, Sensor Driven Airborne Replanner (SDAR), for a Robotic Aircraft Sensor Platform (RASP) N92-12534
FLOATING
Precise relative sea surface positioning of a floating platform using the Global Positioning System (GPS) N92-11987
FLORIDA
Atmospheric environment for Space Shuttle (STS-37) launch
[NASA-TM-103556] N92-12375
FLOW CHARACTERISTICS
Study of detached turbulent flow in an air intake by means of high speed tomography and laser velocimetry
[REPT-90/55] N92-12216
FLOW DISTRIBUTION
Slotted-wall research with disk and parachute models in the DSMA low-speed wind tunnel
[DE90-013631] N92-11966
Flow visualization and flow field measurements of a 1/12 scale tilt rotor aircraft in hover
[NASA-CR-189456] N92-11983
A comparative analysis of XV-15 tiltrotor hover test data and WOPWOP predictions incorporating the fountain effect
[NASA-CR-189455] N92-11992
An experimental and computational investigation of an annular reverse-flow combustor
[UTIAS-338] N92-11996
CARS temperature measurements in a hypersonic propulsion test facility N92-12049
Centaur in-tank explosion flow fields within STS and Titan 4 payload spaces
[NASA-CR-189039] N92-12144
An experimental analysis of lateral jet injection into confined swirling crossflows N92-12199
Heat transfer and instrumentation studies on rotating turbine blades in a transient facility N92-12203
Blade surface pressure measurements on the rotor of a model turbine stage in a transient flow facility N92-12206

Vorticity dynamics of inviscid shear layers
[NASA-CR-189042] N92-12212
Existence of three dimensional, steady, inviscid, incompressible flows with nonvanishing vorticity
[PREPRINT-1365] N92-12219
Aeroacoustics in inhomogeneous flow field
[FFA-TN-1991-30] N92-12601

FLOW EQUATIONS
A comparison of three methods for solving flow equations of two immiscible fluids in variably saturated media
[DE91-016945] N92-12220
A standard test set for numerical approximations to the shallow water equations in spherical geometry
[DE92-000385] N92-12365
Resistive MHD turbulence
[DE90-012935] N92-12700

FLOW MEASUREMENT
Fuel flow measurement in gas turbine testing
[NRC-29808] N92-12000
Lagrangian analysis, data covariance, and the impulse time integral
[DE92-000169] N92-12224

FLOW STABILITY
Efficient multi-dimensional upwinding for the steady Euler equations
[CWI-NM-R9107] N92-12570
Instabilities in SN1987A and other supernovae N92-12934
Turbulization of shear flows in astrophysics N92-12941

FLOW VELOCITY
An experimental and computational investigation of an annular reverse-flow combustor
[UTIAS-338] N92-11996
A planar-fluorescence imaging technique for studying droplet-turbulence interactions in vaporizing sprays N92-12050

FLOW VISUALIZATION
Nonstationary flight aerodynamics in a turbulent environment
[ETN-91-90102] N92-11980
Flow visualization and flow field measurements of a 1/12 scale tilt rotor aircraft in hover
[NASA-CR-189456] N92-11983
Development of advanced flow simulation system by water flow model
[DE90-503438] N92-12197

FLOWMETERS
Calibration of an FTI Omnitrak ballistic flow calibrator system
[NRC-29847] N92-12233

FLUE GASES
Failure analysis of turbine blades
[DE91-631513] N92-12282

FLUENCE
Neutron flux enhancement at LASREF
[DE92-000196] N92-12640

FLUID DYNAMICS
The AFDM (Advanced Fluid Dynamics Model) program: Scope and significance
[DE90-010585] N92-12193
Optical studies in the holographic ground station
[NASA-CR-184257] N92-12239

FLUID FLOW
Combined buoyancy-thermocapillary convection
[NASA-CR-187417] N92-12207
Boiling inside tubes: Saturated wet-wall heat transfer with mixtures
[ESDU-91011] N92-12208
A comparison of three methods for solving flow equations of two immiscible fluids in variably saturated media
[DE91-016945] N92-12220
Resistive MHD turbulence
[DE90-012935] N92-12700

FLUID MECHANICS
COMMIX-1AR/P: A three-dimensional transient single-phase computer program for thermal hydraulic analysis of single and multicomponent systems
[DE91-018703] N92-12222

FLUORESCENCE
Nitrogen dioxide fluorescence following photolysis in a supersonic jet
[DE90-014164] N92-12078
Theoretical spectroscopy of comets N92-12794

FLUTTER
An analytical and experimental study to investigate flutter suppression via piezoelectric actuation
[NASA-TM-893240] N92-12173

FLUTTER ANALYSIS
Investigation of the aeroelastic stability of the AFW wind-tunnel model using CAP-TSD
[NASA-TM-104142] N92-11977

FLUX DENSITY
Basic physics and cosmology from pulsar timing data N92-12971

FLYBY MISSIONS
Halley's spin state determined N92-12858

FLYING PLATFORMS
AI for RPVs, Sensor Driven Airborne Replanner (SDAR), for a Robotic Aircraft Sensor Platform (RASP) N92-12534

FOCAL PLANE DEVICES
Pyroelectric detectors processed on polyvinylidene fluoride and on copolymer, integrated on silicon substrate: Technological approach of infrared unit sensors and matrix arrays
[LAAS-91134] N92-12236

FOCUSING
An astigmatic unstable resonator with an intracavity deformable mirror
[DE91-018815] N92-12257

FOOD PROCESSING
An evaluation of the potential of combination processes involving heat and irradiation for food preservation
[DE91-638734] N92-12423

FORCE DISTRIBUTION
An experimental analysis of lateral jet injection into confined swirling crossflows N92-12199

FORCED CONVECTION
Incipient boiling in microgravity N92-12140
Channel cooling-techniques for repetitively pulsed magnetic switches
[DE90-013077] N92-12165

FOREBODIES
Pitching moment derivative due to rate of pitch for projectiles at supersonic speeds
[ESDU-91004] N92-11967

FORECASTING
Forecast of transportation energy demand through the year 2010
[DE92-000222] N92-12788

FORESTS
Can sulfate fluxes in forest canopy throughfall be used to estimate atmospheric sulfur deposition?
[DE92-000044] N92-12356
Kapuskasing field study relating atmospheric stability to wind drift from aerial forest spray operations
[NRC-LTR-UA-99] N92-12372

FORMALDEHYDE
Observations of formaldehyde and search for cyanoacetylene in Comet Brorsen-Metcalf (1988o) N92-12887

FORMAT
Interpreting measurements obtained with the cloud absorption radiometer
[NASA-CR-189241] N92-12366

FORMING TECHNIQUES
Using computer experiments to construct a cheap substitute for an expensive simulation model --- application to a compression molding process
[DE92-000421] N92-12494

FORWARD SCATTERING
Measurement of rho, the ratio of the real to imaginary part of the (-p)p forward elastic scattering amplitude, at (radical)s = 1.8 TeV
[DE92-000155] N92-12637

FOSSIL FUELS
Implementation of a modified Johnson and Hindmarsh mass and energy model
[DE90-000488] N92-12329

FOULING
Production of desalinated water using ocean thermal energy
[DE91-018894] N92-12336

FOURIER ANALYSIS
A local limit theorem for L-statistics
[CWI-BS-R9033] N92-12582

FOURIER TRANSFORMATION
New concept for a highly-compact Imaging Fourier Transform Spectrometer (IFTS)
[REPT-911-440-110] N92-12240
The radon transform for data reduction, line detection, and artificial neural network preprocessing
[DE90-013521] N92-12516
A two-grid analysis of the combination of mixed finite elements and Vanka-type relaxation
[CWI-NM-R9102] N92-12566
The far infrared optical constants of some common polymers
[NPL-DES-111] N92-12682

FRACTIONATION
Fractionation of terrestrial neon by hydrodynamic hydrogen escape from ancient steam atmospheres N92-12931

FRACTIONS
Fractional crystallization in polymer mixing
[ETN-91-90184] N92-12129

FRACTURE MECHANICS
Numerical verification of NISA 2 finite element analysis of the cracked 5th stage compressor disc of J-85 jet engine
[NRC-LTR-ST-1792] N92-11997
Structures and fracture mechanic of brittle matrix composites
[REPT-911-430-131] N92-12064
Crystallization behavior and effect of thermal history on fracture performance of glass flake reinforced polypropylene
[NRC-29450] N92-12752

FRACTURE STRENGTH
Dynamic delamination crack propagation in a graphite/epoxy laminate
[NASA-CR-187226] N92-12063
Vickers microindentation toughness of a sintered SiC in the median-crack regime
[DE92-000225] N92-12132

FRACTURES (MATERIALS)
On the formation of a joint during cold welding
[DE91-017672] N92-12275
Failure analysis of turbine blades
[DE91-631513] N92-12282

FRACTURING
Interface effects and fracture in Nicalon/SiC composites
[DE90-012925] N92-12055
Spatial variability in the tensile strength of an extruded nuclear-grade graphite
[DE91-018868] N92-12070

FRAGMENTS
Studies of complex fragment emission in heavy ion reactions
[DE92-000532] N92-12653

FREDHOLM EQUATIONS
Fredholm's alternative for impedance boundary value problems in acoustics
[FFA-TN-1990-46] N92-12600

FREE CONVECTION
Channel cooling-techniques for repetitively pulsed magnetic switches
[DE90-013077] N92-12165

FREE ELECTRON LASERS
Workshop on Scientific and Industrial Applications of Free Electron Lasers
[DE90-012038] N92-12245
Progress with the slotted-tube pulsed microwiggler
[DE92-000173] N92-12260
Rapid development of a measurement and control system for the Advanced Free-Electron Laser
[DE92-000178] N92-12261
Physics design of the high brightness linac for the advanced free-electron laser initiative at Los Alamos
[DE92-000179] N92-12262
Even harmonic lasing
[DE92-000207] N92-12263
Physics study of the application of an IFEL (Induction Free Electron Laser) to CIT (Compact Ignition Tokamak)
[DE90-011276] N92-12690
MTX (Microwave Tokamak Experiment) diagnostics and timing system for FEL (Free Electron Laser) heating experiments
[DE90-013067] N92-12695

FREE-PISTON ENGINES
Hardware development and initial subassembly test of a gas-fired Stirling/Rankine residential heat pump
[DE90-012203] N92-12194

FREQUENCIES
Examination of sampling control systems for inverters of limited pulse repetition
[ETN-91-90159] N92-12181
Numerical and experimental study of curved and planar frequency selective surfaces with arbitrary illumination
[NASA-TM-104540] N92-12185

FREQUENCY MODULATION
Coherent communication link using diode-pumped lasers
[NASA-CR-189248] N92-12149
Study of advanced techniques in modulation and coding for digital beam frequencies with large spectral effectiveness
[TELECOM-PARIS-90-E-020] N92-12152

FREQUENCY STABILITY
Thermal design and test results for SUNLITE ultra-stable reference cavity
[NASA-TM-104117] N92-12045

FRICTION
The theory of variational inequalities and its application to contact problems with friction
[ETN-91-90183] N92-12562

FUEL CELLS
Molten carbonate fuel cell research
[DE90-013896] N92-12120

FUEL CONSUMPTION
Performance improvements and fuel cost savings due to leading edge modification of a vintage delta wing jet fighter
[FFA-TN-1991-22] N92-11993
Alternative motor fuel use model: Model theory and design and user's guide
[DE90-012040] N92-12134
Forecast of transportation energy demand through the year 2010
[DE92-000222] N92-12788
FUEL FLOW
Fuel flow measurement in gas turbine testing
[NRC-29808] N92-12000
FUEL GAGES
Calibration of an FTI Omnitrak ballistic flow calibrator system
[NRC-29847] N92-12233
FUEL OILS
Monitoring IACP samples and construction of a centralized database
[PB91-213546] N92-12351
FUEL PRODUCTION
Catalysis and biocatalysis program
[NASA-CR-189452] N92-12392
FUEL SPRAYS
A planar-fluorescence imaging technique for studying droplet-turbulence interactions in vaporizing sprays N92-12050
FULL SCALE TESTS
Tutor aft fuselage and empennage full-scale fatigue test: Resolution of horizontal stabilizer installation difficulties
[NRC-LTR-ST-1804] N92-11990
FUNCTION GENERATORS
Manual for a pattern generator
[LINO-1991-2] N92-12665
FUNCTIONS (MATHEMATICS)
Some simple bounds for approximations of sigmoidal functions in layered neural nets
[REPT-90-022] N92-12511
Design and testing of space-domain minimum average correlation energy (SMACE) filters for 2-D acousto-optic correlators
[DE91-019062] N92-12602
FUSELAGES
Tutor aft fuselage and empennage full-scale fatigue test: Resolution of horizontal stabilizer installation difficulties
[NRC-LTR-ST-1804] N92-11990
FUSION REACTORS
West European magnetic confinement fusion research
[DE90-010911] N92-12704
An analysis of grazing incidence metal mirrors in a laser ICF reactor driver
[DE92-000093] N92-12710
Recent progress in the development of materials for fusion reactors
[DE91-016283] N92-12722
The TITAN reversed-field-pinch fusion reactor study, volume 3
[DE92-000139] N92-12727
FUZZY SETS
Automated threat response recommendation in environments of high data uncertainty using the Countermeasure Association Technique (CMAT) N92-12525

G

G STARS
The evolution of young stellar object disks and their environment N92-12847
A guide to the use of theoretical models of the solar nebula for the interpretation of the meteoritic record N92-12912
GALACTIC CLUSTERS
Photoionization of intergalactic gas and cooling flows in clusters of galaxies N92-12896
Cluster research with x ray observations N92-12948
GALACTIC EVOLUTION
Infrared observations of solar system objects N92-12828
Outer planet studies N92-12829
On the origin of the diffuse x ray background N92-12952
The formation and evolution qf domain walls N92-12965
Extragalactic x ray source counts N92-12967
Ultraluminous infrared galaxies N92-12968
GALACTIC MASS
The peculiar velocity field predicted from the distribution of IRAS galaxies N92-12969
GALACTIC RADIATION
X ray emission from active galactic nuclei N92-12962
GALAXIES
High-Energy Astrophysics. American and Soviet Perspectives
[NASA-CR-186558] N92-12933
The evolution of the gravitational radiation from stellar components of galaxies N92-12959
Ultraluminous infrared galaxies N92-12968
GALILEAN SATELLITES
Radar investigation of asteroids and planetary satellites N92-12837
Infrared speckle interferometry and spectroscopy of Io N92-12870
Radar studies in the solar system N92-12886
GALILEO SPACECRAFT
Centaur in-tank explosion flow fields within STS and Titan 4 payload spaces
[NASA-CR-189039] N92-12144
First spacecraft encounter with an asteroid approaches N92-12890
GALLIUM ARSENIDES
Recovery of high field GaAs photoconductive semiconductor switches
[DE90-013062] N92-12163
Tests on photoconductive semiconductor switches for subnanosecond risetime, multimegavolt pulser applications
[DE91-018797] N92-12190
GAME THEORY
Optimality conditions for minimax tasks: An application example from communications engineering
[ETN-91-90169] N92-12156
GAMMA RAY ASTRONOMY
Generation of ultrahigh-energy gamma rays in accreting x ray pulsars N92-12950
GAMMA RAY BURSTS
Nonthermal synchrotron pair cascades in strong magnetic fields: A gamma ray burst emission model N92-12899
Neutron starquake model for gamma-ray bursts N92-12938
Cosmic gamma-ray bursts N92-12954
A statistical analysis of gamma-ray bursts detected by the Konus Experiment on Venera 11 and 12 N92-12966
GAMMA RAY SPECTROMETERS
The GAMMASPHERE
[DE92-000448] N92-12986
GAMMA RAYS
Designing equipment for use in gamma radiation environments
[DE90-012050] N92-12162
History of the determination of radium in man since 1915
[DE92-000355] N92-12410
Detection system characteristics using Cf-252 ionization chambers
[DE90-011702] N92-12610
Superdeformed nuclei
[DE92-000269] N92-12647
Cosmic gamma-ray bursts N92-12954
Nucleosynthetic gamma ray lines and positrons from supernovae N92-12983
The GAMMASPHERE
[DE92-000448] N92-12986
GAPS
Generalized finite element gap model
[AD-A240559] N92-12471
GAS ANALYSIS
Cluster research with x ray observations N92-12948
GAS CHROMATOGRAPHY
Chemical analysis of trace substances from explosives
[DE91-017833] N92-12084
Chemically modified polymeric resins for high performance liquid chromatography, solid-phase extraction, and organic separation by LC and GC
[DE91-018166] N92-12130
GAS DENSITY
A concept for treating dense-gas dispersion under realistic conditions of terrain and variable winds
[DE90-012892] N92-12343
GAS DETECTORS
Chemical analysis of trace substances from explosives
[DE91-017833] N92-12084
Microsensor research
[DE90-011801] N92-12227
A scintillation detector for measuring inert gas beta rays
[DE91-630700] N92-12634
GAS DYNAMICS
Advanced infrared astronomy N92-12826
GAS FLOW
The variable polarity plasma arc welding process: Characteristics and performance
[NASA-CR-184259] N92-12279
Phenomenology, diagnostics, and non-LTE effects in plasma-particle interactions
[DE90-013088] N92-12701
Gas flow and generation of x ray emission in WR+OB binaries N92-12972
GAS GIANT PLANETS
Interiors and atmospheres of the outer planets N92-12821
Research in planetary Astronomy N92-12831
Studies of thermal wave phenomena on the Jovian planets N92-12867
Near infrared imaging of the outer planets N92-12880
GAS MIXTURES
Anomalous dispersion in gases derived from the optical depth. Theoretical treatment: Line by line calculations
[NDRE/PUBL-91/1002] N92-12675
GAS STREAMS
Spectroscopic analysis of a discharge and a post discharge within a low pressure air stream
[ETN-91-90098] N92-12086
GAS TURBINE ENGINES
An experimental and computational investigation of an annular reverse-flow combustor
[UTIAS-338] N92-11996
Humidity effects on gas turbine performance
[NRC-30241] N92-11998
Fuel flow measurement in gas turbine testing
[NRC-29808] N92-12000
An experimental analysis of lateral jet injection into confined swirling crossflows N92-12199
Heat transfer and instrumentation studies on rotating turbine blades in a transient facility N92-12203
Blade surface pressure measurements on the rotor of a model turbine stage in a transient flow facility N92-12206
Software methodologies for safety critical systems N92-12467
GAS TURBINES
Effects of wake and shock passing on the heat transfer to a film cooled transonic turbine blade N92-12201
Failure analysis of turbine blades
[DE91-631513] N92-12282
GAS VISCOSITY
Heat transfer between stratified liquids with bubbling across the interface
[DE90-008579] N92-12192
GASES
Richtmyer-Meshkov instability of shocked gaseous interfaces
[DE92-000308] N92-12225
Simple model of the gaseous plasma and its soliton solutions
[NRC-30824] N92-12712
GASOLINE
Environmental projects. Volume 13: Underground storage tanks, removal and replacement. Goldstone Deep Space Communications Complex
[NASA-CR-189030] N92-12035
GATES (CIRCUITS)
The behavior and testing implications of CMOS IC logic gate open circuits
[DE91-018679] N92-12189
GAUGE THEORY
Lectures on RCFT (Rational Conformal Field Theory)
[DE90-013731] N92-12593
Topics in gauge theories and the unification of elementary particle interactions
[DE90-013435] N92-12603
Identifying the origin of new gauge bosons at the SSC and LHC
[DE92-000290] N92-12648
GEIGER COUNTERS
History of the determination of radium in man since 1915
[DE92-000355] N92-12410
GENERAL AVIATION AIRCRAFT
Corrosion and your aircraft
[NRC-30465] N92-11991
GENES
A molecular analysis of beta-lactamases and their promotors in Streptomyces
[FOA-B-40392-4.4] N92-12393
Beta-lactamase genes of Streptomyces badius, Streptomyces cacaoi and Streptomyces fradiae: Cloning and expression in Strepotomyces lividans N92-12394
Molecular analysis of beta-lactamases from four species of Streptomyces: Comparison of amino acid sequences with those of other beta-lactamases N92-12395
Transcriptional induction of Streptomyces cacaoi beta-lactamase by a beta-lactam compound N92-12396
Chromogenic identification of promoters in Streptomyces lividans by using an ampC beta-lactamase promoter-probe vector N92-12398

GENETICS
Beta-lactamase genes of Streptomyces badius, Streptomyces cacaoi and Streptomyces fradiae: Cloning and expression in Strepotomyces lividans N92-12394
Mutagenic analysis of the S. fradiae beta-lactamase promoter N92-12397
A bootstrapping approach to robot intelligence: First results
[REPT-90-068] N92-12552
New perspectives about default hierarchies formation in learning classifier systems
[REPT-91-002] N92-12553
GEOCHRONOLOGY
Deuterium on Venus: Observations from Earth N92-12879
Degradation studies of Martian impact craters N92-12905
Cs-135 - Ba-135: A new cosmochronometric constraint on the origin of the Earth and the astrophysical site of the origin of the solar system N92-12915
GEODESY
Precise relative sea surface positioning of a floating platform using the Global Positioning System (GPS) N92-11987
Observation model and parameter partials for the JPL VLBI parameter estimation software MODEST/1991
[NASA-CR-189035] N92-12481
GEOLOGICAL SURVEYS
Geologic mapping of tunnels using photogrammetry-control-point configuration
[DE91-019071] N92-12323
GEOMAGNETISM
Solar-geophysical data number 561, May 1991. Part 1: (Prompt reports). Data for April, March 1991, and late data
[PB91-217331] N92-12980
GEOMETRICAL OPTICS
Workshop on High Heat Load X Ray Optics
[DE90-011799] N92-12673
GEOMORPHOLOGY
Degradation studies of Martian impact craters N92-12905
GEOPHYSICS
Observation model and parameter partials for the JPL VLBI parameter estimation software MODEST/1991
[NASA-CR-189035] N92-12481
GEOSAT SATELLITES
An atlas of monthly mean distributions of GEOSAT sea surface height, SSMI surface wind speed, AVHRR/2 sea surface temperature, and ECMWF surface wind components during 1988
[NASA-CR-189029] N92-12385
GEOTHERMAL RESOURCES
Particle measurement and brine chemistry at the Salton Sea Deep Well
[DE92-000031] N92-12337
GEOTHERMAL TECHNOLOGY
Particle measurement and brine chemistry at the Salton Sea Deep Well
[DE92-000031] N92-12337
GERMANY
Requirements and possible technical solutions derived from the new airmobility concept of the German Army
[MBB-UD-0596-91-PUB] N92-12590
GEYSERS
A database for the Geysers geothermal field
[DE90-013811] N92-12330
GLASS
Advanced study in solid transport: Rheological behavior of dense suspension
[DE90-009025] N92-12196
Crystallization behavior and effect of thermal history on fracture performance of glass flake reinforced polypropylene
[NRC-29450] N92-12752
GLASS TRANSITION TEMPERATURE
Ultrasonic investigation of amorphous polymers (polystyrene) in a wide range of temperature and pressure. 1: Introduction, method, technique, and results
[NRC-29718] N92-12125
GLOBAL POSITIONING SYSTEM
Precise relative sea surface positioning of a floating platform using the Global Positioning System (GPS) N92-11987
GLOBULAR CLUSTERS
Cataclysmic variables in globular clusters and low mass x ray binaries N92-12897
Close binary stars in globular clusters N92-12960
The PSR 2127+12 as an indicator of a massive blac k hole in the core of globular cluster M 15 N92-12964
GLUES
Theoretical and experimental analysis of the fine mechanical behavior of a glued assembly with double slanting layers
[ETN-91-90277] N92-12068
Detailed behavior of a glued double layer assembly in terms of the shearing-off of joint covers N92-12069
GOLD
Gold sulfide replacements of cyanide solutions
[DE91-017981] N92-12111
GRADIOMETERS
Principles of superconductor imaging surface gradiometry
[DE90-008916] N92-12740
GRAIN BOUNDARIES
Mechanical properties and microstructure of pressureless sintered duophase sialon
[DE92-000043] N92-12131
GRANULAR MATERIALS
A semi-analytical model for pressure-time history of granular pyrotechnic materials in a closed system
[DE90-012761] N92-12135
GRAPH THEORY
Synchronization of parallel processes by hardware: Realizations in asynchronous technique
[ETN-91-90164] N92-12509
Process algebra with signals and conditions
[CWI-CS-R9103] N92-12510
GRAPHITE
Spatial variability in the tensile strength of an extruded nuclear-grade graphite
[DE91-018868] N92-12070
High-temperature corrosion of Nicalon(tm)/SiC composites
[DE92-000281] N92-12071
The stability of graphite brushes at high velocity
[ETN-91-90176] N92-12184
GRAPHITE-EPOXY COMPOSITES
A damage tolerance assessment of bonded repairs to CF-18 composite components. Part 1: Adhesive properties
[DREP-TM-88-25-PT-1] N92-12060
Physicochemical characterization of high-performance fibre-reinforced organic-matrix composites. Part 6: Methods for quality control of matrix chemistry
[NRC-28667-PT-6] N92-12061
Dynamic delamination crack propagation in a graphite/epoxy laminate
[NASA-CR-187226] N92-12063
An experimental and numerical study of delamination propagation and arrest in composite beams and plates when subjected to low-velocity impact N92-12299
GRAPHOEPITAXY
Protein crystal growth in low gravity
[NASA-CR-188974] N92-12141
GRAPHS (CHARTS)
On finding minimum-diameter clique trees
[DE92-000386] N92-12579
GRASSLANDS
Estimation of surface heat and moisture fluxes over a prairie grassland using a hybrid biosphere/remote sensing model N92-12320
Rangeland-plant response to elevated CO2
[DE90-013702] N92-12387
GRAVITATION THEORY
Basic physics and cosmology from pulsar timing data N92-12971
GRAVITATIONAL COLLAPSE
A three-dimensional model for molecular cloud collapse and protostellar formation N92-12898
GRAVITATIONAL LENSES
Gravitational lenses: The current sample, recent results, and continuing searches N92-12953
GRAVITATIONAL PHYSIOLOGY
Life sciences report 1987
[NASA-TM-105105] N92-12388
GRAVITATIONAL WAVES
The evolution of the gravitational radiation from stellar components of galaxies N92-12959
Basic physics and cosmology from pulsar timing data N92-12971
GRAVITY WAVES
Two-dimensional wave number spectra of small-scale water surface waves N92-12379
GRAZING INCIDENCE
Full surface testing of grazing incidence mirrors
[AD-A240356] N92-12676
An analysis of grazing incidence metal mirrors in a laser ICF reactor driver
[DE92-000093] N92-12710
GREENHOUSE EFFECT
The potential impact of conservation and alternative energy sources on carbon dioxide emissions
[DE90-008346] N92-12339
The greenhouse effect and acid rain
[DE90-008347] N92-12340
Global climate change and human health: Information needs, research priorities, and strategic considerations
[DE90-012599] N92-12342
Managing global climate change through international cooperation: Lessons from prior resource management efforts
[DE90-014699] N92-12350
Processes for identifying regional influences of and responses to increasing atmospheric CO2 and climate change: The MINK project
[DE91-018606] N92-12353
Processes for identifying regional influences of and responses to increasing atmospheric CO2 and climate change: The MINK project
[DE91-018607] N92-12354
Processes for identifying regional influences of and responses to increasing atmospheric CO2 and climate change: The MINK project
[DE91-018608] N92-12355
GRID GENERATION (MATHEMATICS)
A highly parallel multigrid-like method for the solution of the Euler equations
[NASA-CR-188816] N92-12496
GROUND BASED CONTROL
Control Center Technology Conference Proceedings
[NASA-CP-10081] N92-12010
B-2 and other current flight test control center system architectures N92-12011
Ames life science telescience testbed evaluation
[NASA-CR-188856] N92-12033
GROUND OPERATIONAL SUPPORT SYSTEM
Columbus Free Flying Laboratory (MTFF) logistics, transportation, and ground processing
[MBB-UO-0155-91-PUB] N92-12589
GROUND STATE
Three-dimensional quantum calculations on the ground and excited state vibrations of ethylene N92-12632
Optical properties of MX chain materials: An extended Peierls-Hubbard model
[DE92-000314] N92-12764
GROUND STATIONS
Space station control center architecture N92-12016
Optical studies in the holographic ground station
[NASA-CR-184257] N92-12239
Advanced Satellite Workstation (ASW) N92-12521
GROUND SUPPORT EQUIPMENT
Control Center Technology Conference Proceedings
[NASA-CP-10081] N92-12010
JPL's Space Flight Operations Center: Development project overview N92-12012
Kennedy Space Center Launch Processing System (LPS) and the Test Checkout and Monitoring System 2 (TCMS2) N92-12013
GROUND SUPPORT SYSTEMS
Control Center Technology Conference Proceedings
[NASA-CP-10081] N92-12010
Kennedy Space Center Launch Processing System (LPS) and the Test Checkout and Monitoring System 2 (TCMS2) N92-12013
Ground support system methodology and architecture N92-12018
GROUND TESTS
Resonance and control response tests using a control stimulation drive
[MBB-UD-0586-90-PUB] N92-12003
Optical studies in the holographic ground station
[NASA-CR-184257] N92-12239
GROUND WIND
An atlas of monthly mean distributions of GEOSAT sea surface height, SSMI surface wind speed, AVHRR/2 sea surface temperature, and ECMWF surface wind components during 1988
[NASA-CR-189029] N92-12385
GROUP THEORY
Group decision support systems N92-12502
Computer conferencing: Choices and strategies N92-12503
From knots to quantum groups (and back)
[DE90-013688] N92-12591
Lectures on RCFT (Rational Conformal Field Theory)
[DE90-013731] N92-12593
GUIDANCE (MOTION)
Software for Guidance and Control
[AGARD-CP-503] N92-12449
GUIDANCE SENSORS
Design and development of proprioceptive sensors to be used for mobile robot localization
[LAAS-91178] N92-12238
GUIDE VANES
Effects of wake and shock passing on the heat transfer to a film cooled transonic turbine blade N92-12201
GUN PROPELLANTS
The 27th JANNAF Combustion Subcommittee Meeting, Volume 1
[CPIA-PUBL-557-VOL-1] N92-12048
Shock characterization of nitrocellulose-based gun propellant
[DE91-019057] N92-12137

GUSTS
Thermographic gust wind tunnel measurements
[ONERA-RF-31/3409-PY] N92-11972

H

HADRONS
Large Hadron Collider Workshop. Volume 2: Proceedings
[DE91-634595] N92-12683
HALIDES
Optical properties of MX chain materials: An extended Peierls-Hubbard model
[DE92-000314] N92-12764
HALLEY'S COMET
Analysis and interpretation of CCD data on P/Halley and physical parameters and activity status of cometary nuclei at large heliocentric distance N92-12797
Observational evidence of aging processes in comets N92-12833
Halley's spin state determined N92-12858
The last disconnection events in Comet Halley in April 1986 N92-12862
Laboratory simulation of the surface of Halley's Comet N92-12872
Outburst of Comet Halley at 14.3 AU N92-12881
HALOCARBONS
Thermal conductivity of gaseous halogenated hydrocarbons
[ESDU-91005] N92-12080
Climate Monitoring and Diagnostics Laboratory no. 18
[PB91-205559] N92-12371
HALOGENATION
Vapour pressures and critical points of liquids. Halogenated ethylenes
[ESDU-91006] N92-12081
HAMILTONIAN FUNCTIONS
Solving the discretized time-independent Schroedinger equation in the Lanczos procedure N92-12630
HARDENERS
Modelling the cure of Narmco 5208: A method for determining the chemical state of the prepreg
[NRC-29449] N92-12126
HARDNESS TESTS
Vickers microindentation toughness of a sintered SiC in the median-crack regime
[DE92-000225] N92-12132
HARMONIC GENERATIONS
Molecular to material design for anomalous-dispersion phase-matched second harmonic generation
[DE91-017999] N92-12683
HARMONIC RADIATION
Third plasma harmonic radiation in type 2 bursts
[MPE-PREPRINT-203] N92-12982
HARMONICS
Even harmonic lasing
[DE92-000207] N92-12263
HEART
Cardiac magnetic resonance imaging by retrospective gating: Mathematical modelling and reconstruction algorithms
[CWI-AM-R9024] N92-12408
HEART FUNCTION
Cardiac magnetic resonance imaging by retrospective gating: Mathematical modelling and reconstruction algorithms
[CWI-AM-R9024] N92-12408
HEAT AFFECTED ZONE
Computer modeling of arc welds to predict effects of critical variables on weld penetration
[DE92-000428] N92-12283
HEAT FLUX
An experimental technique for investigation of instantaneous wall heat flux to a turbulent boundary layer in water N92-12200
Boiling inside tubes: Saturated wet-wall heat transfer with mixtures
[ESDU-91011] N92-12208
COMMIX-1AR/P: A three-dimensional transient single-phase computer program for thermal hydraulic analysis of single and multicomponent systems
[DE91-018703] N92-12222
HEAT MEASUREMENT
Measurements of heat and mass transfer coefficients during absorption of water vapor by lithium bromide and (Li,K,Na)NO3 mixtures
[DE91-014212] N92-12088
An experimental technique for investigation of instantaneous wall heat flux to a turbulent boundary layer in water N92-12200
Developments and directions in 200 MHz very high power RF at LAMPF
[DE92-000175] N92-12667
The thermodynamic properties of benzothiazole and benzoxazole
[DE91-002250] N92-12769
HEAT PIPES
Maintaining optimum light output with a thermally conductive heat pipe
[DE90-012423] N92-12195
HEAT PUMPS
Hardware development and initial subassembly test of a gas-fired Stirling/Rankine residential heat pump
[DE90-012203] N92-12194
Experimental analysis of direct-expansion ground-coupled heat pump systems
[DE92-000420] N92-12226
HEAT RESISTANT ALLOYS
Strength evaluation for modified 12Cr steel and A286 steel of USC turbine rotor materials
[DE90-503033] N92-12099
HEAT SOURCES
Uncertainty analysis report for Ulysses, volume 1
[DE91-013476] N92-12039
Safety Evaluation Report for Ulysses, volume 2
[DE91-013475] N92-12040
Thulium heat source for high-endurance and high-energy density power systems
[DE91-018991] N92-12666
HEAT STORAGE
Conventional wallboard with latent heat storage for passive solar applications
[DE90-012136] N92-12325
HEAT TRANSFER
Heat transfer between stratified liquids with bubbling across the interface
[DE90-008579] N92-12192
The AFDM (Advanced Fluid Dynamics Model) program: Scope and significance
[DE90-010585] N92-12193
An experimental technique for investigation of instantaneous wall heat flux to a turbulent boundary layer in water N92-12200
Effects of wake and shock passing on the heat transfer to a film cooled transonic turbine blade N92-12201
Fluid oscillations and enhanced heat transfer in a parallel plate channel bounded by end reservoirs maintained at different temperature N92-12202
Boiling inside tubes: Saturated wet-wall heat transfer with mixtures
[ESDU-91011] N92-12208
Heat-transfer material
[DE91-017723] N92-12221
COMMIX-1AR/P: A three-dimensional transient single-phase computer program for thermal hydraulic analysis of single and multicomponent systems
[DE91-018703] N92-12222
Trends in dish-Stirling solar receiver designs
[DE90-011507] N92-12324
HEAT TRANSFER COEFFICIENTS
Measurements of heat and mass transfer coefficients during absorption of water vapor by lithium bromide and (Li,K,Na)NO3 mixtures
[DE91-014212] N92-12088
Fluid oscillations and enhanced heat transfer in a parallel plate channel bounded by end reservoirs maintained at different temperature N92-12202
HEAT TREATMENT
An evaluation of the potential of combination processes involving heat and irradiation for food preservation
[DE91-638734] N92-12423
Forming process of 110 K high-Tc phase in Bi-Pb-Sr-Ca-Cu-O system
[DE91-628642] N92-12761
HEATERS
Incipient boiling in microgravity N92-12140
HEATING
Workshop on High Heat Load X Ray Optics
[DE90-011799] N92-12673
HEAVY IONS
An experiment to observe strange particle production in ion collisions at the AGS
[DE92-000135] N92-12636
Studies of complex fragment emission in heavy ion reactions
[DE92-000532] N92-12653
HEAVY NUCLEI
Experimental results from studies on nucleus-nucleus collisions at high energy
[DE90-012286] N92-12658
HELICOPTER CONTROL
Resonance and control response tests using a control stimulation drive
[MBB-UD-0586-90-PUB] N92-12003
Application of Eigenstructure Assignment to the control of powered lift combat aircraft
[RAE-TM-FS-1009] N92-12004
The development of a requirement specification for an experimental active flight control system for a variable stability helicopter: An Ada simulation in JSD N92-12466
HELICOPTERS
Helicopter integrated helmet requirements and test results
[MBB-UD-0595-91-PUB] N92-12422
Process/object-oriented Ada software design for an experimental helicopter N92-12461
The development of a requirement specification for an experimental active flight control system for a variable stability helicopter: An Ada simulation in JSD N92-12466
HELIOTRONS
Magnetic field structure near the plasma boundary in helical systems and divertor tokamaks
[NIFS-17] N92-12708
HELMETS
Helmet mounted sight and display testing
[MBB-UD-0594-91-PUB] N92-12421
Helicopter integrated helmet requirements and test results
[MBB-UD-0595-91-PUB] N92-12422
HEMATITE
Iddingsite in the Nakhla meteorite: TEM study of mineralogy and texture of pre-terrestrial (Martian?) alterations N92-12929
HEMATOLOGY
Immunological and biochemical effects of 60 Hz electric and magnetic fields in humans
[DE90-012546] N92-12402
Immunological and biochemical effects of 60 Hz electric and magnetic fields in humans
[DE90-012547] N92-12403
HETERODYNING
Ground based infrared measurements of the global distribution of ozone in the atmosphere of Mars N92-12875
HETEROGENEITY
Nd-142/Nd-144 in SNCs and early differentiation of a heterogeneous Martian mantle N92-12925
HEURISTIC METHODS
Heuristic methods for optimal trajectory planning of robotic manipulators N92-12272
Heuristic route optimization: A model for force level route planning N92-12520
HIERARCHIES
Sensory processing and world modeling for an active ranging device
[NASA-CR-188915] N92-12319
New perspectives about default hierarchies formation in learning classifier systems
[REPT-91-002] N92-12553
HIGH ENERGY INTERACTIONS
Experimental results from studies on nucleus-nucleus collisions at high energy
[DE90-012286] N92-12658
A research program in experimental high energy physics
[DE90-013321] N92-12659
Research program in experimental high energy physics, task B
[DE90-013323] N92-12660
JAZELLE: An enhanced data management system for high energy physics
[DE90-013571] N92-12662
HIGH FREQUENCIES
Evaluation of components, subsystems, and networks for high rate, high frequency space communications
[NASA-TM-105274] N92-12151
HIGH POLYMERS
Determination of the impact fracture parameters in ductile polymers
[NRC-28433] N92-12128
HIGH POWER LASERS
Narrow-bandwidth diffraction-limited coupled stable-unstable resonator laser cavity
[AD-D014974] N92-12251
Large area laser conditioning of dielectric thin film mirrors
[DE90-013485] N92-12674
HIGH PRESSURE
Velocity and pressure characteristics of a model SSME high pressure fuel turbopump
[NASA-CR-184239] N92-12273
Composite load spectra for select space propulsion structural components
[NASA-CR-189048] N92-12306
The VUV emissivity of a high pressure cascade argon arc from 125 to 200 nm N92-12718
Superconducting La2CuO(4+x) prepared by oxygenation at high pressure: A Raman scattering study
[DE90-012915] N92-12747

HIGH REYNOLDS NUMBER
The BCAC/IAR collaborative research program to investigate the sidewall boundary layer effects in the IAR/NRC 2-D High Reynolds Number Test Facility
[NRC-HSA-434] N92-11976
HIGH SPEED
Study of detached turbulent flow in an air intake by means of high speed tomography and laser velocimetry
[REPT-90/55] N92-12216
Composite load spectra for select space propulsion structural components
[NASA-CR-189048] N92-12306
D0 data acquisition: High speed data paths for D0
[DE90-013326] N92-12444
HIGH TEMPERATURE
Maintaining optimum light output with a thermally conductive heat pipe
[DE90-012423] N92-12195
HIGH TEMPERATURE GASES
Gas flow and generation of x ray emission in WR+OB binaries N92-12972
HIGH TEMPERATURE PLASMAS
Cluster research with x ray observations N92-12948
HIGH TEMPERATURE SUPERCONDUCTORS
Effects of ambient background gases on YBCO plume propagation under film growth conditions: Spectroscopic, ion probe, and fast photographic studies
[DE92-000431] N92-12737
Theory of exotic superconducting and normal states of heavy electron and high T(sub c) materials
[DE90-012688] N92-12745
Stoichiometry and irradiation effects in melt grown Tl-Ca-Ba-Cu-O single crystals
[DE90-013365] N92-12749
Strengthening of composites by internal stresses: Determination by neutron diffraction
[DE91-018549] N92-12756
The flux jumps in high Tc Bi(1.7)Pb(0.3)Sr2 Ca2Cu3O(y) bulk superconductor
[DE91-628641] N92-12760
Forming process of 110 K high-Tc phase in Bi-Pb-Sr-Ca-Cu-O system
[DE91-628642] N92-12761
Effect of cooling rate on the transition temperature in Bi-Pb-Sr-Ca-Cu-O system
[DE91-628643] N92-12762
Properties of epitaxial YBa2Cu3O(7-delta)-based superconducting superlattices
[DE92-000423] N92-12765
HIGH VOLTAGES
A repetitive, one microsecond, thirty-five kilojoule, two hundred kilovolt pulse generator
[DE90-013063] N92-12167
HILBERT SPACE
Convexly constrained ill posed problems and their regularization, using iterative processes
[ETN-91-90156] N92-12560
HOLES (ELECTRON DEFICIENCIES)
Derivation of the high field semiconductor equations
[DE92-000249] N92-12763
HOLOGRAPHY
The NRCC three-dimensional image data files
[NRC-29077] N92-12234
Optical studies in the holographic ground station
[NASA-CR-184257] N92-12239
HOMOGENEITY
Physicochemical investigation of the compatibilization of polyolefin/polyamide blends: Morphology, thermal analysis, and specific interactions
[NRC-29455] N92-12124
Aeroacoustics in inhomogeneous flow field
[FFA-TN-1991-30] N92-12601
HOMOGENEOUS TURBULENCE
Numerical simulation of compressible homogeneous turbulence N92-12204
HONEYCOMB STRUCTURES
Nondestructive testing of sandwich structures
[REPT-911-430-137] N92-12066
The GAMMASPHERE
[DE92-000448] N92-12986
HOT PRESSING
Synthesis of Al/Al3Ti two-phase alloys by mechanical alloying
[DE92-000193] N92-12117
HOT WORKING
Evaluation of the fabricability of advanced austenitic tubing
[DE91-017158] N92-12109
The effect of working process on hydrogenate orientation of Zr-4 alloy tube
[DE91-629474] N92-12114
HOVERING
Flow visualization and flow field measurements of a 1/12 scale tilt rotor aircraft in hover
[NASA-CR-189456] N92-11983
A comparative analysis of XV-15 tiltrotor hover test data and WOPWOP predictions incorporating the fountain effect
[NASA-CR-189455] N92-11992
HUBBLE SPACE TELESCOPE
Control center operations at the Goddard Space Flight Center N92-12023
HUMAN BODY
Sandia severe electrostatic discharge tester: Version 3 (SSET), serial number 1
[DE91-018582] N92-12243
History of the determination of radium in man since 1915
[DE92-000355] N92-12410
HUMAN CENTRIFUGES
Evaluation of the Aerazur multifunctional flight suit in centrifugal tests
[REPT-38/CEV/SE/LAMAS] N92-12419
HUMAN FACTORS ENGINEERING
The effect of on/off indicator design on state confusion, preference, and response time performance, executive summary
[NASA-CR-185662] N92-12416
Ergonomics applied to operational systems in space stations
[NRC-28710] N92-12418
HUMIDITY
Humidity effects on gas turbine performance
[NRC-30241] N92-11998
HURRICANES
Summary of 1991 Atlantic tropical cyclone activity and seasonal forecast verification: A year of no hurricanes in the tropics but an unusually large number of higher latitude baroclinically influenced tropical cyclone systems N92-12376
Extended range forecast of Atlantic seasonal hurricane activity for 1992 N92-12377
HYDRATES
Clathrate type 2 hydrate formation in vacuo under astrophysical conditions N92-12906
HYDRIDES
Compaction of TiH(1.65)/KClO4 pyrotechnic powder during confined burn
[DE90-013199] N92-12136
HYDROCYANIC ACID
Radar interferometric studies of comets N92-12845
HYDRODYNAMIC EQUATIONS
A three-dimensional model for molecular cloud collapse and protostellar formation N92-12898
HYDRODYNAMICS
Periodically structured multiphase flows and hydrodynamic instabilities in narrow capillaries
[DE91-018802] N92-12223
Fractionation of terrestrial neon by hydrodynamic hydrogen escape from ancient steam atmospheres N92-12931
Instabilities in SN1987A and other supernovae N92-12934
The shock breakout in SN1987A modelled with the time-dependent radiative transfer N92-12939
Hydrodynamic study of Supernova 1987A: The phase of a wave of cooling and recombination N92-12973
Radiation-driven evolution of low-mass x ray binaries and the formation of millisecond pulsars
[DE92-000123] N92-12975
HYDROELECTRIC POWER STATIONS
An experimental study of the volatility of ammonium chloride from aqueous solutions to high temperatures
[DE91-017875] N92-12090
HYDROGEN
Characteristics of an electron-beam rocket pellet accelerator
[DE92-000073] N92-12053
Resonances in recombination of atomic hydrogen due to long-range H3 molecular states N92-12627
Thermal generation and mobility of charge carriers in collective proton transport in hydrogen-bonded chains
[DE92-000306] N92-12649
Fractionation of terrestrial neon by hydrodynamic hydrogen escape from ancient steam atmospheres N92-12931
HYDROGEN ATOMS
Quantum Monte Carlo for atoms and molecules
[DE90-013793] N92-12608
Spin-exchange and dipole relaxation rates in atomic hydrogen: Rigorous and simplified calculations N92-12622
Decay of spin-polarized atomic hydrogen in the presence of a Bose condensate N92-12624
Spin-polarized atomic hydrogen in very strong magnetic fields N92-12626
HYDROGEN EMBRITTLEMENT
Metallic corrosion: Causes and case histories
[NRC-LTR-ST-1798] N92-12105
HYDROGEN ISOTOPES
Hydrogen isotopic exchange over palladium metal
[DE90-012063] N92-12076
HYDROGENATION
Control of catalytic hydrotreating selectivity with ammonia
[DE91-018084] N92-12091
The effect of working process on hydrogenate orientation of Zr-4 alloy tube
[DE91-629474] N92-12114
Probe molecule studies: Active species in alcohol synthesis
[DE92-000332] N92-12138
The thermodynamic properties of benzothiazole and benzoxazole
[DE91-002250] N92-12769
HYDROLYSIS
Current issues in sol-gel reaction kinetics
[DE90-012226] N92-12074
HYPERBOLIC DIFFERENTIAL EQUATIONS
The ODE formulation of hyperbolic PDE's discretized by the spectral collocation method
[FFI-91/7011] N92-12576
HYPERCUBE MULTIPROCESSORS
Solving stochastic linear programs on a hypercube multicomputer
[AD-A240630] N92-12472
HYPERSONIC FLIGHT
CARS temperature measurements in a hypersonic propulsion test facility N92-12049
HYPERSONIC FLOW
Study of hypersonic flow turbulence models
[CERT-RF-36/5005-32] N92-11971
An assessment and application of turbulence models for hypersonic flows
[NASA-TM-105124] N92-11984
HYPERSONIC VEHICLES
Air-breathing hypersonic vehicle guidance and control studies; An integrated trajectory/control analysis methodology: Phase 1
[NASA-CR-187623] N92-12002
HYPERSONIC WIND TUNNELS
Compression ramp in rarefied gas
[RC-90-08] N92-11978
Flat planes in rarefied hypersonic flows
[SESSIA-430/91-940] N92-11979
HYPERVELOCITY IMPACT
Ar-39-Ar-40 of achondrites: Evidence for a lunar-like cataclysm N92-12907
Imaging analysis of LDEF craters N92-12927
HYPERVELOCITY LAUNCHERS
Hypervelocity explosive launchers
[DE90-011713] N92-12036
HYSTERESIS
A process for the calculation by approximation of the Preisach operator with usual differential equation applications
[ETN-91-90157] N92-12561

I

IAPETUS
Detection of solid C(triple bond)N bearing materials on solar system bodies N92-12866
ICE
Volatiles in the outer solar system N92-12807
Laboratory simulation of the surface of Halley's Comet N92-12872
Minor planet 1566 Icarus: Asteroid or comet? N92-12895
Interstellar organics and possible connections with the carbonaceous components of meteorites and IDPs N92-12902
Methanol in the sky with diamonds N92-12903
Clathrate type 2 hydrate formation in vacuo under astrophysical conditions N92-12906
IDEAL GAS
Thermal conductivity of gaseous halogenated hydrocarbons
[ESDU-91005] N92-12080
IDENTIFYING
A contribution to the identification of internal faults in electrical machines
[ETN-91-90167] N92-12183
Processes for identifying regional influences of and responses to increasing atmospheric CO2 and climate change: The MINK project
[DE91-018606] N92-12353
Minor planet 1566 Icarus: Asteroid or comet? N92-12895
IFF SYSTEMS (IDENTIFICATION)
Integrated Communications, Navigation, Identification, Avionics (ICNIA) expert system for fault tolerant avionics N92-12539

IGNITION
Physics study of the application of an IFEL (Induction Free Electron Laser) to CIT (Compact Ignition Tokamak)
[DE90-011276] N92-12690
IMAGE ANALYSIS
SAR imaging of vortex ship wakes. Volume 3: An overview of pre-ERS-1 observations and models
[FFI-91/7007-VOL-3] N92-12157
Identification of the mechanical behavior of solid materials
[ISBN-90-386-0041-0] N92-12304
Interactive digital image display and analysis system (IDIDAS) user's guide
[NOAA-TR-NESDIS-59] N92-12470
Segmentation of complex geometric forms by the curvature method
[NRC-31210] N92-12475
Direct estimation of deformable motion parameters from a range image sequence
[NRC-31757] N92-12476
Morphological discretization
[CWI-BS-R9105] N92-12479
Algebraic error analysis for surface curvatures of 3-D range images
[NRC-30297] N92-12559
Planetary optical and infrared imaging N92-12849
IMAGE FILTERS
Design and testing of space-domain minimum average correlation energy (SMACE) filters for 2-D acousto-optic correlators
[DE91-019062] N92-12602
IMAGE INTENSIFIERS
Papers presented at Seventh International Workshop on Stellarators
[DE90-625560] N92-12698
IMAGE PROCESSING
Bulletin of the Division of Electrical Engineering, 1987-1988, volume 3, number 2
[NRC-29078-VOL-3-NO-2] N92-12177
A system for calibrating the wrist-mounted laser range finder
[NRC-29799] N92-12252
Monocular 3D vision for a robot assembly environment
[DE90-010824] N92-12264
Inspection of materials and structures by infrared thermography: Signal processing techniques for defect enhancement and characterization
[NRC-29717] N92-12291
Two-dimensional wave number spectra of small-scale water surface waves N92-12379
Space and Earth Science Data Compression Workshop
[NASA-CP-3130] N92-12425
A fast online event display for a high intensity fixed-target spectrometer
[DE90-012047] N92-12443
On the construction of translation and rotation invariant morphological operators
[CWI-AM-R9025] N92-12486
Algorithms and VLSI architecture designs for image transformation in real time
[TELECOM-PARIS-90-E-021] N92-12489
Real-time VLSI architecture for geometric image transformations N92-12490
The radon transform for data reduction, line detection, and artificial neural network preprocessing
[DE90-013521] N92-12516
Design and testing of space-domain minimum average correlation energy (SMACE) filters for 2-D acousto-optic correlators
[DE91-019062] N92-12602
Fast Optically Sensitive Segmented Array (FOSSA)
[DE91-018997] N92-12684
IMAGE RECONSTRUCTION
Three dimensional reconstruction of vascular networks in trinocular vision
[TELECOM-PARIS-90-E-022] N92-12406
Cardiac magnetic resonance imaging by retrospective gating: Mathematical modelling and reconstruction algorithms
[CWI-AM-R9024] N92-12408
IMAGE ROTATION
On the construction of translation and rotation invariant morphological operators
[CWI-AM-R9025] N92-12486
Algorithms and VLSI architecture designs for image transformation in real time
[TELECOM-PARIS-90-E-021] N92-12489
IMAGERY
Segmentation of complex geometric forms by the curvature method
[NRC-31210] N92-12475
IMAGES
Perceived sharpness in static and moving images
[ETN-91-90138] N92-12413
Some methods of encoding simple visual images for use with a sparse distributed memory, with applications to character recognition
[NASA-CR-188848] N92-12436
IMAGING SPECTROMETERS
New concept for a highly-compact Imaging Fourier Transform Spectrometer (IFTS)
[REPT-911-440-110] N92-12240
The MPE/UCB far-infrared imaging Fabry-Perot interferometer (FIFI)
[NASA-CR-185495] N92-12242
MERIS data compression: A presentation of the current status of the study
[REPT-911-440-113] N92-12322
The moderate resolution imaging spectrometer: An EOS facility instrument candidate for application of data compression methods N92-12427
IMAGING TECHNIQUES
A planar-fluorescence imaging technique for studying droplet-turbulence interactions in vaporizing sprays N92-12050
Planar laser imaging of sprays for liquid rocket studies N92-12051
Unattended optical surveillance equipment
[DE90-013403] N92-12228
The NRCC three-dimensional image data files
[NRC-29077] N92-12234
Lawrence Livermore National Laboratory Underwater Laser Imaging System (UWLIS) development project
[DE91-019001] N92-12258
Three dimensional reconstruction of vascular networks in trinocular vision
[TELECOM-PARIS-90-E-022] N92-12406
Cardiac magnetic resonance imaging by retrospective gating: Mathematical modelling and reconstruction algorithms
[CWI-AM-R9024] N92-12408
Microgravity science requirements and the need for data compression N92-12430
Algorithms and VLSI architecture designs for image transformation in real time
[TELECOM-PARIS-90-E-021] N92-12489
Real-time VLSI architecture for geometric image transformations N92-12490
AI for RPVs, Sensor Driven Airborne Replanner (SDAR), for a Robotic Aircraft Sensor Platform (RASP) N92-12534
Three-dimensional explicit depth migration via McClellan transformations on hexagonal sampling grids
[DE91-017370] N92-12558
Recognition of three dimensional shapes: Application to chemical molecules
[TELECOM-PARIS-90-E-018] N92-12613
Papers presented at Seventh International Workshop on Stellarators
[DE90-625560] N92-12698
Principles of superconductor imaging surface gradiometry
[DE90-008916] N92-12740
Physical observations of comets: Their composition, origin and evolution N92-12805
Planetary Spectroscopy N92-12811
Cometary spectroscopy and imaging N92-12827
Time-lapse CCD imagery of plasma-tail motions in Comet Austin N92-12874
IMIDES
Novel approaches to the calculation of the electronic structure and dynamics of excited states: Application to trans-di-imide and ethylene
[ETN-91-90309] N92-12628
Semiclassical calculation of the vibrational structure of the (B) 1B(sub u) Rydberg state of trans-di-imide from ab initio CI potential energy surfaces N92-12629
IMMUNITY
Cosmos-1989 immunology studies
[NASA-CR-188970] N92-12389
Effect of space flight on interferon production - mechanistic studies
[NASA-CR-188972] N92-12390
IMMUNOLOGY
Cosmos-1989 immunology studies
[NASA-CR-188970] N92-12389
Immunological and biochemical effects of 60 Hz electric and magnetic fields in humans
[DE90-012546] N92-12402
Immunological and biochemical effects of 60 Hz electric and magnetic fields in humans
[DE90-012547] N92-12403
Nuclear Medicine Program
[DE92-000383] N92-12411
IMPACT DAMAGE
Determination of the impact fracture parameters in ductile polymers
[NRC-28433] N92-12128
Degradation studies of Martian impact craters N92-12905
Imaging analysis of LDEF craters N92-12927
IMPACT LOADS
Determination of the impact fracture parameters in ductile polymers
[NRC-28433] N92-12128
IMPACT TESTS
Dynamic delamination crack propagation in a graphite/epoxy laminate
[NASA-CR-187226] N92-12063
High explosives skid impact initiation study
[DE90-011266] N92-12133
Determination of the contact forces between a projectile and a hard target
[DE91-018354] N92-12281
IMPEDANCE
High power impedance matchers with 100-ps risetime
[DE90-013516] N92-12150
IMPEDANCE MATCHING
High power impedance matchers with 100-ps risetime
[DE90-013516] N92-12150
IMPLOSIONS
Over forty years of continuous research at UTIAS on nonstationary flows and shock waves
[UTIAS-50] N92-11974
IMPROVEMENT
Research needs for improvement of protection against explosive or toxic industrial chemicals hazards
[FOA-C-40286-4.5] N92-12147
IMPULSES
Lagrangian analysis, data covariance, and the impulse time integral
[DE92-000169] N92-12224
On the theory of impulse breakdown in gases
[NRC-31510] N92-12711
IMPURITIES
Atomic and molecular data for metallic impurities in fusion plasmas
[DE90-012213] N92-12688
INCLUSIONS
Theory of inclusions in the elastic and elastic-plastic deformation of composite materials N92-12056
INCOMPRESSIBLE FLOW
Stochastic and collisional diffusion in two-dimensional periodic flows
[DE90-014335] N92-12198
Numerical solution of incompressible Navier-Stokes equations using a velocity-vorticity formulation N92-12205
Existence of three dimensional, steady, inviscid, incompressible flows with nonvanishing vorticity
[PREPRINT-1365] N92-12219
INDENTATION
Million-atom plane-strain indentation studies via nonequilibrium molecular dynamics
[DE90-012075] N92-12095
Vickers microindentation toughness of a sintered SiC in the median-crack regime
[DE92-000225] N92-12132
INDEXES (DOCUMENTATION)
Aerospace medicine and biology: A continuing bibliography with indexes (supplement 354)
[NASA-SP-7011(354)] N92-12404
Aerospace medicine and biology: A continuing bibliography with indexes (supplement 355)
[NASA-SP-7011(355)] N92-12412
Bibliography of Lewis Research Center technical publications announced in 1990
[NASA-TM-103753] N92-12786
Asteroid absolute magnitudes and slope parameters N92-12888
INDICATING INSTRUMENTS
The effect of on/off indicator design on state confusion, preference, and response time performance, executive summary
[NASA-CR-185662] N92-12416
INDOOR AIR POLLUTION
Air movement, comfort and ventilation in workstations
[DE92-000667] N92-12424
INDUSTRIAL WASTES
Recent trends in waste-reduction efforts in the US manufacturing sector
[DE92-000197] N92-12357
INDUSTRIES
Recent trends in waste-reduction efforts in the US manufacturing sector
[DE92-000197] N92-12357
Control mechanisms in Italian business groups
[REPT-90-014] N92-12775
INELASTIC SCATTERING
Nuclear structure theory
[DE90-013949] N92-12609
Constraints placed on the Higgs sector from precision electroweak measurements
[DE92-000236] N92-12643

Jet rates from deep inelastic muon scattering in the W range of 15 to 35 GeV
[DE92-000470] N92-12651

INEQUALITIES
The theory of variational inequalities and its application to contact problems with friction
[ETN-91-90183] N92-12562

INERTIAL CONFINEMENT FUSION
A laser-produced lithium ion source for pulsed-power inertial confinement fusion
[DE90-013401] N92-12702
An analysis of grazing incidence metal mirrors in a laser ICF reactor driver
[DE92-000093] N92-12710
Overview of the Los Alamos National Laboratory Inertial Confinement Fusion Program
[DE92-000199] N92-12731

INERTIAL NAVIGATION
Locally linear neural networks for aerospace navigation systems N92-12530

INFILTRATION
A comparison of three methods for solving flow equations of two immiscible fluids in variably saturated media
[DE91-016945] N92-12220

INFORMATION
information and information processing N92-12779

INFORMATION DISSEMINATION
Vertical integration of science, technology, and applications
[DE90-013552] N92-12344

INFORMATION FLOW
Information logistics: A production-line approach to information services N92-12506

INFORMATION MANAGEMENT
Networking at NASA. Johnson Space Center N92-12498
Using NetMaster to manage IBM networks N92-12500
Information logistics: A production-line approach to information services N92-12506
The business case for connectivity N92-12507

INFORMATION RETRIEVAL
The moderate resolution imaging spectrometer: An EOS facility instrument candidate for application of data compression methods N92-12427

INFORMATION SYSTEMS
Vertical integration of science, technology, and applications
[DE90-013552] N92-12344
Space and Earth Science Data Compression Workshop
[NASA-CP-3130] N92-12425
Data compression: The end-to-end information systems perspective for NASA space science missions N92-12426
Networking at NASA. Johnson Space Center N92-12498
The business case for connectivity N92-12507
Contents of the JPL Distributed Active Archive Center (DAAC) archive, version 2-91
[NASA-CR-189027] N92-12784

INFORMATION THEORY
Cross-functional systems N92-12504
Reasoning with uncertain and incomplete information in aerospace applications N92-12544
Information and information processing N92-12779

INFRARED ABSORPTION
Infrared observations of small solar system bodies N92-12802

INFRARED ASTRONOMY
The MPE/UCB far-infrared imaging Fabry-Perot interferometer (FIFI)
[NASA-CR-185495] N92-12242
Infrared studies of star formation in the rho Ophiuchi dark cloud N92-12790
Infrared observations of small solar system bodies N92-12802
Infrared observations of comets N92-12815
Advanced infrared astronomy N92-12826
Infrared observations of solar system objects N92-12828
Research in planetary Astronomy N92-12831
Physical processes in comets N92-12835
Stellar occultations by planetary rings: 3 July 1989 28 SGR occultation by Saturn N92-12838
Groundbased cometary studies N92-12841
Visible and infrared investigations of planet-crossing asteroids and outer solar system objects N92-12851
Studies of thermal wave phenomena on the Jovian planets N92-12867
Near infrared imaging of the outer planets N92-12880

INFRARED ASTRONOMY SATELLITE
Nearby main sequence stars with cool circumstellar material N92-12904
Ultraluminous infrared galaxies N92-12968
The peculiar velocity field predicted from the distribution of IRAS galaxies N92-12969

INFRARED DETECTORS
Pyroelectric detectors processed on polyvinylidene fluoride and on copolymer, integrated on silicon substrate: Technological approach of infrared unit sensors and matrix arrays
[LAAS-91134] N92-12236
Infrared image detector utilizing Schottky barrier junctions
[AD-D014976] N92-12677

INFRARED IMAGERY
Thermographic gust wind tunnel measurements
[ONERA-RF-31/3409-PY] N92-11972
Nondestructive testing of sandwich structures
[REPT-911-430-137] N92-12066
Inspection of materials and structures by infrared thermography: Signal processing techniques for defect enhancement and characterization
[NRC-29717] N92-12291
Infrared image detector utilizing Schottky barrier junctions
[AD-D014976] N92-12677
Planetary optical and infrared imaging N92-12849
Near infrared imaging of the outer planets N92-12880

INFRARED INTERFEROMETERS
Infrared speckle interferometry and spectroscopy of Io N92-12820
Infrared speckle interferometry and spectroscopy of Io N92-12870

INFRARED LASERS
Workshop on Scientific and Industrial Applications of Free Electron Lasers
[DE90-012038] N92-12245

INFRARED PHOTOGRAPHY
Research in planetary Astronomy N92-12831

INFRARED PHOTOMETRY
Visual and infrared studies of asteroids and the Pluto-Charon system N92-12848
Visual and near-IR spectrophotometry of asteroids N92-12878

INFRARED RADIATION
Infrared image detector utilizing Schottky barrier junctions
[AD-D014976] N92-12677
Infrared spectral studies of asteroids N92-12796
Ground based infrared measurements of the global distribution of ozone in the atmosphere of Mars N92-12875
Ultraluminous infrared galaxies N92-12968

INFRARED SPACE OBSERVATORY (ISO)
ISO optical subsystem
[REPT-911-440-115] N92-12681

INFRARED SPECTRA
Infrared spectral studies of asteroids N92-12796
Infrared observations of small solar system bodies N92-12802
Volatiles in the outer solar system N92-12807
Spectroscopic planetary detection N92-12808
Studies of thermal wave phenomena on the Jovian planets N92-12809
Infrared observations of solar system objects N92-12828

INFRARED SPECTROSCOPY
Infrared and ultraviolet spectroscopic ellipsometry using a cascaded arc as light source N92-12719
The a-Si:H films produced by an expanding argon-silane plasma investigated with spectroscopic infrared ellipsometry N92-12721
Infrared variability of Jupiter and Saturn N92-12825
Advanced infrared astronomy N92-12826
Ground based infrared measurements of the global distribution of ozone in the atmosphere of Mars N92-12875
Ethylene line emission from the North Pole of Jupiter N92-12876

INFRARED TELESCOPES
Infrared observations of comets N92-12815
Ground based infrared measurements of the global distribution of ozone in the atmosphere of Mars N92-12875
Ethylene line emission from the North Pole of Jupiter N92-12876

INHIBITORS
Pulsed laser fluorometry for environmental monitoring
[DE90-013163] N92-12249
The role of inhibitors during electrodeposition of thin metallic films
[DE90-014177] N92-12750

INHOMOGENEITY
Central limit theorem for non-homogeneous processes with independent increments and semimarkov switchings
[CWI-AM-R9026] N92-12564
Chaotic inflationary universe and the anisotropy of the large-scale structure N92-12943

INITIATION
High explosives skid impact initiation study
[DE90-011266] N92-12133

INJECTION
Tritium proof-of-principle pellet injector
[DE92-000390] N92-12734

INJECTION MOLDING
Tensile properties of injection molded long fiber thermoplastic composites
[NRC-29456] N92-12062

INJECTORS
Tritium proof-of-principle pellet injector
[DE92-000390] N92-12734

INSECTICIDES
Kapuskasing field study relating atmospheric stability to wind drift from aerial forest spray operations
[NRC-LTR-UA-99] N92-12372

INSPECTION
Design, manufacture, and calibration of Foucault current sensors
[DCR/M-51739/F-90] N92-12235

INSULATORS
Fabrication and assembly of BOLVAPS (boil-off lithium vapor source) ceramic-option half anodes
[DE90-012012] N92-12661

INTAKE SYSTEMS
Velocity and pressure characteristics of a model SSME high pressure fuel turbopump
[NASA-CR-184239] N92-12273

INTEGRAL EQUATIONS
Chemical potential from integral equations using scaled particle theory
[DE90-011277] N92-12075
A computer program for the 2-D magnetostatic problem based on integral equations for the field of the conductors and boundary elements
[DE92-000130] N92-12596
Nonsingular integral equation for two-body scattering and applications in two and three dimensions N92-12625

INTEGRATED CIRCUITS
IC defect-sensitivity: Theory and computational models for yield prediction
[UDC-621.382.049.77:681.306(043)] N92-12175
A Linear Variable Differential Transfer (LVDT) conditioner for the bundle profile monitor of AmPS
[DIGEL-1991-1] N92-12178
Thermal analysis report of the SANDAC V processor module
[DE91-018889] N92-12191
Integrated, non-volatile, high-speed analog random access memory
[NASA-CASE-NPO-17998-1-CU] N92-12438

INTEGRATED MISSION CONTROL CENTER
Control Center Technology Conference Proceedings
[NASA-CP-10081] N92-12010
Advanced technologies for Mission Control Centers N92-12028
Future applications of artificial intelligence to Mission Control Centers N92-12032

INTEGRATED OPTICS
Analysis of cladded uniaxial single crystal fibers
[NRC-32596] N92-12678

INTERACTING GALAXIES
Ultraluminous infrared galaxies N92-12968

INTERACTIONAL AERODYNAMICS
Compression ramp in rarefied gas
[RC-90-08] N92-11978
Flow visualization and flow field measurements of a 1/12 scale tilt rotor aircraft in hover
[NASA-CR-189456] N92-11983

INTERFACES
Richtmyer-Meshkov instability of shocked gaseous interfaces
[DE92-000308] N92-12225

INTERFEROMETERS
Full surface testing of grazing incidence mirrors
[AD-A240356] N92-12676
A novel scanning interferometer for two-dimensional plasma density measurements
[DE90-625514] N92-12697

INTERFEROMETRY
New concept for a highly-compact Imaging Fourier Transform Spectrometer (IFTS)
[REPT-911-440-110] N92-12240
Plasma electron density measurement with multichannel microwave interferometer on the HL-1 tokamak device
[DE91-628422] N92-12724
Radar interferometric studies of comets N92-12845

INTERFERON
Effect of space flight on interferon production - mechanistic studies
[NASA-CR-188972] N92-12390

INTERGALACTIC MEDIA
Photoionization of intergalactic gas and cooling flows in clusters of galaxies N92-12896
INTERGRANULAR CORROSION
Metallic corrosion: Causes and case histories [NRC-LTR-ST-1798] N92-12105
Corrosion under stress of AISI 304 steel in thiocyanate solutions [DE91-631523] N92-12115
INTERLAYERS
The interaction of SiC with Fe, Ni, and their alloys [ETN-91-90137] N92-12103
INTERMETALLICS
Development of test methods for determining material deformability and yield stress, on the basis of intermetallic connections [ETN-91-90130] N92-12303
A simple model for localized-itinerant magnetic systems: Crystal field effects [DE90-625399] N92-12746
INTERNAL COMBUSTION ENGINES
Material and lubricant relationships in the tribology of internal combustion engines [DE92-000674] N92-12284
INTERNAL CONVERSION
P-d capture reactions in muonic molecules [DE92-000256] N92-12645
INTERPLANETARY DUST
Transmission electron microscopy of an interplanetary dust particle with links to CI chondrites N92-12919
INTERPOLATION
A scalable coherent cache system with incomplete directory state [DE90-010862] N92-12434
INTERPROCESSOR COMMUNICATION
Network programming: A design method and programming strategy for large software systems N92-12459
Solving stochastic linear programs on a hypercube multicomputer [AD-A240630] N92-12472
INTERSECTIONS
Palomar Planet-Crossing Asteroid Survey (PCAS) N92-12819
INTERSTELLAR CHEMISTRY
Laser studies of the photodissociation dynamics of cometary radicals N92-12823
Methanol in the sky with diamonds N92-12903
Physical conditions and heating/cooling processes in high mass star formation regions [MPE-PREPRINT-200] N92-12974
INTERSTELLAR GAS
Physical processes in comets N92-12835
Ultraluminous infrared galaxies N92-12968
INTERSTELLAR MATTER
Infrared studies of star formation in the rho Ophiuchi dark cloud N92-12790
Refractive interstellar scintillation effects in pulsar observations N92-12791
Physical conditions and heating/cooling processes in high mass star formation regions [MPE-PREPRINT-200] N92-12974
INVARIANCE
On the construction of translation and rotation invariant morphological operators [CWI-AM-R9025] N92-12486
INVENTORY MANAGEMENT
Information logistics: A production-line approach to information services N92-12506
INVERTERS
Examination of sampling control systems for inverters of limited pulse repetition [ETN-91-90159] N92-12181
INVESTMENT
The stock exchange market and company groups [REPT-90-015] N92-12776
INVISCID FLOW
Vorticity dynamics of inviscid shear layers [NASA-CR-189042] N92-12212
Existence of three dimensional, steady, inviscid, incompressible flows with nonvanishing vorticity [PREPRINT-1365] N92-12219
IO
Galileo-related ground-based observations of the Jovian System N92-12798
Infrared speckle interferometry and spectroscopy of Io N92-12820
Studies of extended planetary atmospheres N92-12822
Ground-based observations of comets, the Jupiter plasma Torus, and Io N92-12840
Io's atmosphere detected by ground-based microwave spectroscopy N92-12859
Infrared speckle interferometry and spectroscopy of Io N92-12870
Io's radar properties N92-12883
Global scale auroral emissions on Jupiter N92-12891
Tentative identification of a newly discovered class of material on Io N92-12892
ION ACOUSTIC WAVES
Measurements of laser wavelength scaling ion acoustic decay instability and associated effects in laser-plasma interaction experiments [DE90-011434] N92-12691
ION BEAMS
The laser system of the optically pumped ion source at TRIUMF [DE90-013102] N92-12248
Ion stability in bunched electron beams [DE90-014087] N92-12611
ION CYCLOTRON RADIATION
Papers presented at Seventh International Workshop on Stellarators [DE90-625560] N92-12698
The Ion Cyclotron Heating (ICH) system for BPX [DE92-000426] N92-12736
ION EXCHANGING
Controlled microstructure oxide coating for chemical sensors [DE90-012223] N92-12119
Mercury as an environmental pollutant [DE90-013392] N92-12349
ION EXTRACTION
Interpretation of ion energy spectra of laser plasmas, by recombination model [ETN-91-90170] N92-12713
ION PROBES
Effects of ambient background gases on YBCO plume propagation under film growth conditions: Spectroscopic, ion probe, and fast photographic studies [DE92-000431] N92-12737
ION SOURCES
The laser system of the optically pumped ion source at TRIUMF [DE90-013102] N92-12248
A laser-produced lithium ion source for pulsed-power inertial confinement fusion [DE90-013401] N92-12702
ION TEMPERATURE
Measurement of charge exchange reaction constants both at equilibrium and out of equilibrium in a Paul trap [ETN-91-90103] N92-12361
Cooling of ions trapped in potential wells produced by electromagnetic radiation fields [DE91-631104] N92-12635
ION TRAPS (INSTRUMENTATION)
Measurement of charge exchange reaction constants both at equilibrium and out of equilibrium in a Paul trap [ETN-91-90103] N92-12361
IONIC COLLISIONS
Cooling of ions trapped in potential wells produced by electromagnetic radiation fields [DE91-631104] N92-12635
An experiment to observe strange particle production in ion collisions at the AGS [DE92-000135] N92-12636
Unitarity and pion production in relativistic heavy-ion collisions [DE92-000212] N92-12641
Atomic and molecular data for metallic impurities in fusion plasmas [DE90-012213] N92-12688
IONIZATION
Resonance ionization mass spectrometry for materials analysis and characterization [DE90-013187] N92-12077
Laserable KrF(*)-excimer discharge with integrated preionization [ETN-91-90177] N92-12253
Workshop on Artificially Ionized Layers in the Atmosphere [DE90-013470] N92-12358
Laboratory simulation of the surface of Halley's Comet N92-12872
IONIZATION CHAMBERS
History of the determination of radium in man since 1915 [DE92-000355] N92-12410
Detection system characteristics using Cf-252 ionization chambers [DE90-011702] N92-12610
Tracking and vertex finding with drift chambers and neural networks [DE92-000472] N92-12652
IONIZED GASES
Gas flow and generation of x ray emission in WR+OB binaries N92-12972
IONIZING RADIATION
Biological dosimetry: A review of methods available for determination of ionizing radiation dose [FOA-C-40282-4.3] N92-12400
Optical observations of active galactic nuclei N92-12946
IRON
The interaction of SiC with Fe, Ni, and their alloys [ETN-91-90137] N92-12103
IRON ALLOYS
Weldability of iron aluminides [DE90-012722] N92-12096
Development of surface treatments and alloy modifications for corrosion-resistant oxide scales [DE90-012723] N92-12097
Designing precipitation-strengthened iron-aluminides for high-temperature applications [DE90-013832] N92-12100
IRON METEORITES
Cosmogenic Ar-36 from neutron capture by Cl-35 in the Chico L6 chondrite: Additional evidence for large shielding N92-12914
IRON OXIDES
Molten carbonate fuel cell research [DE90-013896] N92-12120
IRRADIATION
Electron beam irradiation of polymer blends [ETN-91-90139] N92-12122
An evaluation of the potential of combination processes involving heat and irradiation for food preservation [DE91-638734] N92-12423
Stoichiometry and irradiation effects in melt grown Tl-Ca-Ba-Cu-O single crystals [DE90-013365] N92-12749
Magnetization studies of irradiation modified single crystal Y1Ba2Cu3O7 superconductors: Flux creep and annealing effects [DE91-018858] N92-12758
ISOTOPE SEPARATION
Enhanced use of CLIPS at the Los Alamos National Laboratory [DE92-000305] N92-12493
ISOTOPES
Interstellar organics and possible connections with the carbonaceous components of meteorites and IDPs N92-12902
ISOTROPIC MEDIA
Backward collinear acousto-optic interactions in bulk materials [NRC-29095] N92-12679
ISOTROPIC TURBULENCE
Numerical simulation of compressible homogeneous turbulence N92-12204
The modelling of turbulence and downbursts for flight simulators [UTIAS-339] N92-12373
ITERATIVE SOLUTION
A research program in finite element analysis and iterative solution on advanced processors [DE90-013958] N92-12446
Convexly constrained ill posed problems and their regularization, using iterative processes [ETN-91-90156] N92-12560
Parallel diagonally implicit Runge-Kutta-Nystroem methods [CWI-NM-R9103] N92-12567
A computer program for the 2-D magnetostatic problem based on integral equations for the field of the conductors and boundary elements [DE92-000130] N92-12596
IUE
Observing SN 1987A with the International Ultraviolet Explorer N92-12957

J

J-85 ENGINE
Numerical verification of NISA 2 finite element analysis of the cracked 5th stage compressor disc of J-85 jet engine [NRC-LTR-ST-1792] N92-11997
JAPAN
Survey on possibility to utilize effectively underground space [DE92-703044] N92-12417
JET ENGINES
A derivation of gross thrust for a sea-level jet engine test cell [NRC-30165] N92-12001
JET FLOW
Nitrogen dioxide fluorescence following photolysis in a supersonic jet [DE90-014164] N92-12078
JOINT EUROPEAN TORUS
West European magnetic confinement fusion research [DE90-010911] N92-12704

JOINTS (JUNCTIONS)
A damage tolerance assessment of bonded repairs to CF-18 composite components. Part 1: Adhesive properties
[DREP-TM-88-25-PT-1] N92-12060
Detailed behavior of a glued double layer assembly in terms of the shearing-off of joint covers N92-12069
ACLICO: An aid system for designing bonded joints
[REPT-911-430-134] N92-12146
Acousto-ultrasonics for adhesive bond evaluation
[NRC-LTR-ST-1799] N92-12289
Development of test methods for determining material deformability and yield stress, on the basis of intermetallic connections
[ETN-91-90130] N92-12303
Study of adhesive elastoplastic glued joints
[REPT-NT-24192/AQEN] N92-12308

JOSEPHSON JUNCTIONS
Thermal effects on the Josephson series-array voltage standard
[DE90-008738] N92-12160

JOURNAL BEARINGS
Variable impedance journal bearings for rotor-bearing systems N92-12270

JUDGMENTS
The effect of on/off indicator design on state confusion, preference, and response time performance, executive summary
[NASA-CR-185662] N92-12416

JUPITER (PLANET)
Studies of thermal wave phenomena on the Jovian planets N92-12809
Ethylene line emission from the North Pole of Jupiter N92-12876
Global scale auroral emissions on Jupiter N92-12891

JUPITER ATMOSPHERE
Long term changes in reflectivity and large scale motions in the atmosphere of Jupiter and Saturn N92-12795
Infrared variability of Jupiter and Saturn N92-12825
Ground-based observations of comets, the Jupiter plasma Torus, and Io N92-12840
Ethylene line emission from the North Pole of Jupiter N92-12876

JUPITER SATELLITES
Radar studies in the solar system N92-12886

K

K-EPSILON TURBULENCE MODEL
Turbulent boundary layer solution for two-dimensional compressible flow using mixing length and K-epsilon turbulence models
[AD-A233771] N92-12213

KALMAN FILTERS
Spectral factorization of linear periodic systems with application to the optimal prediction of periodic ARMA models
[REPT-90-013] N92-12768

KAMACITE
Distribution of silicon between kamacite and taenite N92-12911

KAON PRODUCTION
Strangeness production at 200 GeV/Nucleon
[DE92-000259] N92-12646

KILOMETRIC WAVES
Generation of auroral kilometric radiation in upper hybrid wave-lower hybrid soliton interaction
[MPE-PREPRINT-202] N92-12364

KINEMATICS
Vorticity dynamics of inviscid shear layers
[NASA-CR-189042] N92-12212
Stiffness control of teleoperators with redundant, dissimilar kinematics
[DE90-011642] N92-12265
A virtual sensor approach to robot kinematic identification: Theory and experimental implementation
[DE90-012186] N92-12267
Constraint treatment techniques and parallel algorithms for multibody dynamic analysis N92-12297
Kinematic measurement of alpha particles accompanied by spontaneous fission of Cf-252
[ETN-91-90175] N92-12618
Evolution on large-scale plasma structures in comets: Kinematics and physics N92-12801

KLEIN-GORDON EQUATION
Bit-string scattering theory
[DE90-008013] N92-12555

KNOWLEDGE BASES (ARTIFICIAL INTELLIGENCE)
Sensory processing and world modeling for an active ranging device
[NASA-CR-188915] N92-12319
A synergistic approach to reasoning for autonomous satellites N92-12522
TACAID: A knowledge based system for tactical decision making N92-12524
A NASA/RAE cooperation in the development of a real-time knowledge based autopilot N92-12528
Adaptive tactical navigation program N92-12529
Pilot's associate: Evolution of a functional prototype N92-12531
A threat management system N92-12535
A knowledge-based intelligent tutoring system: ACQUIRE (tm)-ITS N92-12543
A distributed agent architecture for real-time knowledge-based systems: Real-time expert systems project, phase 1
[NASA-CR-188947] N92-12781
Practical implications of theories of uncertainty for uncertainty elicitation
[DE91-017949] N92-12782

KNOWLEDGE REPRESENTATION
Constraint propagation through electromagnetic interaction topologies
[NRC-31761] N92-12154
TACAID: A knowledge based system for tactical decision making N92-12524
Practical implications of theories of uncertainty for uncertainty elicitation
[DE91-017949] N92-12782

KONDO EFFECT
Theory of exotic superconducting and normal states of heavy electron and high T(sub c) materials
[DE90-012688] N92-12745

KRYPTON FLUORIDE LASERS
Laserable KrF(*)-excimer discharge with integrated preionization
[ETN-91-90177] N92-12253
Improved KrF laser design for the Laboratory Microfusion Facility
[DE92-000171] N92-12259

L

LABORATORIES
Adaptation of an industrial application for an instructional laboratory in mechanical vibrations
[DE90-013692] N92-12295

LAMINAR FLOW
Boundary layer transition
[CERT-RTS-55/5018-45] N92-12210

LAMINATES
A general nonlinear theory of large elastic deformation of layered plates N92-12296
An experimental and numerical study of delamination propagation and arrest in composite beams and plates when subjected to low-velocity impact N92-12299

LAND USE
Report of a workshop on using remote sensing to estimate land use change
[DE90-011278] N92-12318

LANDAU DAMPING
Full-wave calculation of fast-wave current drive in tokamaks including k(sub (parallel)) upshifts
[DE92-000048] N92-12726

LANGUAGE PROGRAMMING
The syntax and semantics of micro CRL
[CWI-CS-R9076] N92-12480
Embedding as a tool for language comparison
[CWI-CS-R9102] N92-12483

LANTHANUM COMPOUNDS
Specific heat of La(2-x)Sr(x)CuO4; volume fraction of superconductivity; possible structural transition at 45 K
[DE90-011585] N92-12744
Superconducting La2CuO(4+x) prepared by oxygenation at high pressure: A Raman scattering study
[DE90-012915] N92-12747

LARGE SPACE STRUCTURES
Hierarchical controlled component synthesis of large space structures
[DE90-013476] N92-12038
Optimal control of large space structures using distributed gyricity: A continuum approach
[UTIAS-341] N92-12042

LASER APPLICATIONS
Thermal design and test results for SUNLITE ultra-stable reference cavity
[NASA-TM-104117] N92-12045
Planar laser imaging of sprays for liquid rocket studies N92-12051
Laser spectroscopy: Assessment of research needs for laser technologies applied to advanced spectroscopic methods
[DE90-011788] N92-12244
Workshop on Scientific and Industrial Applications of Free Electron Lasers
[DE90-012038] N92-12245
Pulsed laser fluorometry for environmental monitoring
[DE90-013163] N92-12249
Laser conditioning of optical thin films
[DE90-013483] N92-12672
Large area laser conditioning of dielectric thin film mirrors
[DE90-013485] N92-12674
Laser ablation synthesis and properties of epitaxial YBa2Cu3O(7-delta) / PrBa2Cu3O(7-delta) superconducting superlattices
[DE92-000447] N92-12766

LASER BEAMS
Narrow-bandwidth diffraction-limited coupled stable-unstable resonator laser cavity
[AD-D014974] N92-12251

LASER CAVITIES
Thermal design and test results for SUNLITE ultra-stable reference cavity
[NASA-TM-104117] N92-12045
Narrow-bandwidth diffraction-limited coupled stable-unstable resonator laser cavity
[AD-D014974] N92-12251

LASER DAMAGE
An analysis of grazing incidence metal mirrors in a laser ICF reactor driver
[DE92-000093] N92-12710

LASER DOPPLER VELOCIMETERS
An experimental analysis of lateral jet injection into confined swirling crossflows N92-12199
Study of a technique of low level turbulence detection
[ETN-91-90107] N92-12215
Study of detached turbulent flow in an air intake by means of high speed tomography and laser velocimetry
[REPT-90/55] N92-12216

LASER FUSION
Measurements of laser wavelength scaling ion acoustic decay instability and associated effects in laser-plasma interaction experiments
[DE90-011434] N92-12691
MTX (Microwave Tokamak Experiment) diagnostics and timing system for FEL (Free Electron Laser) heating experiments
[DE90-013067] N92-12695
An analysis of grazing incidence metal mirrors in a laser ICF reactor driver
[DE92-000093] N92-12710

LASER HEATING
MTX (Microwave Tokamak Experiment) diagnostics and timing system for FEL (Free Electron Laser) heating experiments
[DE90-013067] N92-12695

LASER INDUCED FLUORESCENCE
Pulsed laser fluorometry for environmental monitoring
[DE90-013163] N92-12249

LASER MODES
The characters of slab lasers
[DE90-625397] N92-12246

LASER OUTPUTS
Narrow-bandwidth diffraction-limited coupled stable-unstable resonator laser cavity
[AD-D014974] N92-12251
Laserable KrF(*)-excimer discharge with integrated preionization
[ETN-91-90177] N92-12253
A tunable continuous-wave titanium-doped sapphire laser
[FFI-91/7006] N92-12254
Flashlamp pumping of Nd:glass disk amplifiers
[DE90-013482] N92-12703

LASER PLASMAS
Method and apparatus for producing a photopumped VUV laser in Mo(6+) ion-containing plasma
[AD-D014961] N92-12250
Measurements of laser wavelength scaling ion acoustic decay instability and associated effects in laser-plasma interaction experiments
[DE90-011434] N92-12691
A laser-produced lithium ion source for pulsed-power inertial confinement fusion
[DE90-013401] N92-12702
Interpretation of ion energy spectra of laser plasmas, by recombination model
[ETN-91-90170] N92-12713
Effects of ambient background gases on YBCO plume propagation under film growth conditions: Spectroscopic, ion probe, and fast photographic studies
[DE92-000431] N92-12737

LASER PUMPING
Coherent communication link using diode-pumped lasers
[NASA-CR-189248] N92-12149
Three-dimensional particle-in-cell modeling of relativistic electron beam production and transport for KrF laser pumping
[DE90-013050] N92-12247
The laser system of the optically pumped ion source at TRIUMF
[DE90-013102] N92-12248

Method and apparatus for producing a photopumped VUV laser in Mo(6+) ion-containing plasma
[AD-D014961] N92-12250
Flashlamp pumping of Nd:glass disk amplifiers
[DE90-013482] N92-12703

LASER RANGE FINDERS
A system for calibrating the wrist-mounted laser range finder
[NRC-29799] N92-12252
Potential of tuneable lasers for optimised dual-colour laser ranging
[REPT-911-440-111] N92-12255
Toward the optimisation of passive ground targets in spaceborne laser ranging
[REPT-911-440-112] N92-12256

LASER SPECTROSCOPY
Resonance ionization mass spectrometry for materials analysis and characterization
[DE90-013187] N92-12077
Laser spectroscopy: Assessment of research needs for laser technologies applied to advanced spectroscopic methods
[DE90-011788] N92-12244

LASER STABILITY
The characters of slab lasers
[DE90-625397] N92-12246

LASER TARGET INTERACTIONS
Recent (e,2e) studies: Laser excited atoms, autoionization, Auger processes, and thin films
[DE91-634156] N92-12614

LASER TARGETS
Measurements of laser wavelength scaling ion acoustic decay instability and associated effects in laser-plasma interaction experiments
[DE90-011434] N92-12691

LASERS
Method and apparatus for producing a photopumped VUV laser in Mo(6+) ion-containing plasma
[AD-D014961] N92-12250
An astigmatic unstable resonator with an intracavity deformable mirror
[DE91-018815] N92-12257
Lawrence Livermore National Laboratory Underwater Laser Imaging System (UWLIS) development project
[DE91-019001] N92-12258
Sensory processing and world modeling for an active ranging device
[NASA-CR-188915] N92-12319

LASING
Even harmonic lasing
[DE92-000207] N92-12263

LATENT HEAT
Conventional wallboard with latent heat storage for passive solar applications
[DE90-012136] N92-12325

LATTICES (MATHEMATICS)
Concept lattices with anti-endomorphism
[ETN-91-90182] N92-12594

LAUNCH VEHICLES
The design and performance estimates for the propulsion module for the booster of a TSTO vehicle
[NASA-TM-105299] N92-11995
Vibroacoustic Payload Environment Prediction System (VAPEPS): VAPEPS management center remote access guide
[NASA-CR-189448] N92-12292

LAUNCH WINDOWS
Atmospheric environment for Space Shuttle (STS-37) launch
[NASA-TM-103556] N92-12375

LAUNCHING
Safety Evaluation Report for Ulysses, volume 2
[DE91-013475] N92-12040

LAUNCHING SITES
Launch site operations for Columbus Free Flyer and resupply mission
[MBB-UO-0153-91-PUB] N92-12034

LAYOUTS
IC defect-sensitivity: Theory and computational models for yield prediction
[UDC-621.382.049.77:681.306(043)] N92-12175

LEAD ACID BATTERIES
Performance evaluation of advanced battery technologies for electric vehicle applications
[DE90-013895] N92-12171

LEAD ALLOYS
Reduced molybdenum oxidation states in hydrodesulfurization catalysis by Chevrel phases
[DE91-018168] N92-12092
Forming process of 110 K high-Tc phase in Bi-Pb-Sr-Ca-Cu-O system
[DE91-628642] N92-12761

LEAD ISOTOPES
Theoretical nuclear physics
[DE92-000022] N92-12615

LEAD ZIRCONATE TITANATES
Piezoelectric devices using sol gel thin films
[NRC-31370] N92-12751

LEADING EDGE SWEEP
Maximum lift of wings with trailing-edge flaps at low speeds
[ESDU-91014] N92-11970

LEADING EDGES
Performance improvements and fuel cost savings due to leading edge modification of a vintage delta wing jet fighter
[FFA-TN-1991-22] N92-11993

LEAKAGE
Environmental projects. Volume 13: Underground storage tanks, removal and replacement. Goldstone Deep Space Communications Complex
[NASA-CR-189030] N92-12035

LEAST SQUARES METHOD
Displacement ranks and fast algorithms
[TELECOM-PARIS-91-E-001] N92-12474

LENNARD-JONES POTENTIAL
Chemical potential from integral equations using scaled particle theory
[DE90-011277] N92-12075

LEPTONS
Topics in gauge theories and the unification of elementary particle interactions
[DE90-013435] N92-12603
The riddle of high-energy baryon number violation
[DE92-000253] N92-12644

LEUKOCYTES
Cosmos-1989 immunology studies
[NASA-CR-188970] N92-12389

LEVITATION
Computation of magnetic suspension of maglev systems using dynamic circuit theory
[DE91-017973] N92-12280
Simultaneous determination of optical and thermodynamic properties of an evaporating aqueous solution droplet
[DE90-010652] N92-12767

LIBRARIES
The NRCC three-dimensional image data files
[NRC-29077] N92-12234

LIE GROUPS
Consistency conditions and representations of a q-deformed Virasoro algebra
[DE90-013715] N92-12359
Consistent multiparameter quantisation of GL(n)
[DE90-013689] N92-12592

LIFE (DURABILITY)
A method for multiaxial fatigue life prediction using energy approaches
[DE91-018851] N92-12315

LIFE SCIENCES
Ames life science telescience testbed evaluation
[NASA-CR-188856] N92-12033
Life sciences report 1987
[NASA-TM-105105] N92-12388

LIFE SUPPORT SYSTEMS
Ultrasonic applications for space-based life support systems N92-12415

LIFT
Lift-curve slope of wing-body combinations
[ESDU-91007] N92-11968
Effect of twin fins on isolated tailplane lift-curve slope
[ESDU-91009] N92-11969
Maximum lift of wings with trailing-edge flaps at low speeds
[ESDU-91014] N92-11970

LIFTING ROTORS
Helicopter main-rotor speed effects: A comparison of predicted ranges of detection from the aural detection program ICHIN and the electronic detection program ARCAS
[NASA-TM-104134] N92-12598

LIGANDS
Nuclear Medicine Program
[DE92-000383] N92-12411

LIGHT BEAMS
An astigmatic unstable resonator with an intracavity deformable mirror
[DE91-018815] N92-12257

LIGHT CURVE
Visual and infrared studies of asteroids and the Pluto-Charon system N92-12848
Planetary astronomy N92-12863
Regular variability of the shape of the primary minimum of the orbital light curve of SS 433 with the phase of the precessional period N92-12942
Cosmic gamma-ray bursts N92-12954
X ray radiation from Supernova 1987A. The results of the Kvant module in 1987-1989 N92-12970

LIGHT EMISSION
Spectroscopic analysis of a discharge and a post discharge within a low pressure air stream
[ETN-91-90098] N92-12066

LIGHT EMITTING DIODES
Fast Optically Sensitive Segmented Array (FOSSA)
[DE91-018997] N92-12684

LIGHT MODULATION
Design and testing of 3-level optimal correlation filters
[DE91-019059] N92-12685

LIGHT SCATTERING
Stimulated Raman scattering in optical fibers: Polychromatic single-field numerical experiments
[DE90-012894] N92-12671
Development of high spectral resolution lidar technology
[DE92-000080] N92-12686
Simultaneous determination of optical and thermodynamic properties of an evaporating aqueous solution droplet
[DE90-010652] N92-12767

LIGHT SOURCES
A wall stabilized arc as a light source for spectroscopic techniques
[ETN-91-90308] N92-12715
Solid state radioluminescent sources using tritium-loaded zeolites
[DE91-019061] N92-12759

LIMB DARKENING
Long term changes in reflectivity and large scale motions in the atmosphere of Jupiter and Saturn N92-12795

LIMITERS (FUSION REACTORS)
A system to deposit boron films (boronization) in the D3-D tokamak
[DE92-000288] N92-12733

LIMITS (MATHEMATICS)
Central limit theorem for non-homogeneous processes with independent increments and semimarkov switchings
[CWI-AM-R9026] N92-12564
A local limit theorem for L-statistics
[CWI-BS-R9033] N92-12582

LINE SHAPE
Anomalous dispersion in gases derived from the optical depth. Theoretical treatment: Line by line calculations
[NDRE/PUBL-91/1002] N92-12675
Ethylene line emission from the North Pole of Jupiter N92-12876

LINE SPECTRA
Advanced infrared astronomy N92-12826
Ground-based observations of comets, the Jupiter plasma Torus, and Io N92-12840
Ethylene line emission from the North Pole of Jupiter N92-12876
Deuterium on Venus: Observations from Earth N92-12879
Radiative transfer in planetary atmospheres: Submillimeter-wave spectroscopy of comets N92-12885
The cyclotron absorption line and eclipse transition phenomena of 4U 1538-52 N92-12944
Observing SN 1987A with the International Ultraviolet Explorer N92-12957
Nucleosynthetic gamma ray lines and positrons from supernovae N92-12983

LINEAR ACCELERATORS
Physics design of the high brightness linac for the advanced free-electron laser initiative at Los Alamos
[DE92-000179] N92-12262
Neutron flux enhancement at LASREF
[DE92-000196] N92-12640
New technology for linear colliders
[DE92-000081] N92-12664
Developments and directions in 200 MHz very high power RF at LAMPF
[DE92-000175] N92-12667

LINEAR FILTERS
Optimal stochastic control of multirate sampled-data systems
[REPT-90-019] N92-12586

LINEAR PREDICTION
Displacement ranks and fast algorithms
[TELECOM-PARIS-91-E-001] N92-12474

LINEAR PROGRAMMING
Solving stochastic linear programs on a hypercube multicomputer
[AD-A240630] N92-12472

LINEAR QUADRATIC GAUSSIAN CONTROL
Optimal stochastic control of multirate sampled-data systems
[REPT-90-019] N92-12586

LINEAR SYSTEMS
Selected methods for the investigation of linear, continuous and discrete-continuous mechanical models of a rail
[ILR-MITT-261(1991)] N92-12277

Modal interaction in linear dynamic systems near degenerate modes
[NASA-TM-105315] N92-12316
Robustness of feedback stabilization: A topological approach
[ETN-91-90142] N92-12545
General pole structure assignment in singular systems
[MATHS-REPT-A-147] N92-12554
Descriptor representations without direct feedthrough term
[CWI-BS-R9103] N92-12563
Comments on: Stabilizability and detectability of discrete-time time-varying systems
[REPT-90-014] N92-12571
Differential periodic Riccati equations: A note on the existence of an infinite number of periodic strong solutions
[REPT-90-020] N92-12574

LINEARIZATION
Linearisation of diode detectors for use in a multistate reflectometer
[NPL-DES-104] N92-12241
A general nonlinear theory of large elastic deformation of layered plates N92-12296

LINKS (MATHEMATICS)
Tait's flyping conjecture for well-connected links
[CWI-BS-R9037] N92-12584

LIQUID CHROMATOGRAPHY
Modelling the cure of Narmco 5208: A method for determining the chemical state of the prepreg
[NRC-29449] N92-12126
Chemically modified polymeric resins for high performance liquid chromatography, solid-phase extraction, and organic separation by LC and GC
[DE91-018166] N92-12130

LIQUID FUELS
The AFDM (Advanced Fluid Dynamics Model) program: Scope and significance
[DE90-010585] N92-12193

LIQUID HYDROGEN
Centaur in-tank explosion flow fields within STS and Titan 4 payload spaces
[NASA-CR-189039] N92-12144

LIQUID OXYGEN
Centaur in-tank explosion flow fields within STS and Titan 4 payload spaces
[NASA-CR-189039] N92-12144

LIQUID ROCKET PROPELLANTS
The 27th JANNAF Combustion Subcommittee Meeting, Volume 1
[CPIA-PUBL-557-VOL-1] N92-12048

LIQUIDS
Vapour pressures and critical points of liquids. Halogenated ethylenes
[ESDU-91006] N92-12081
Determination of diffusion coefficients in liquids using the diaphragm cell method
[DE91-018403] N92-12093
Dielectric-liquid pulsed power switch
[DE90-009425] N92-12168
Heat transfer between stratified liquids with bubbling across the interface
[DE90-008579] N92-12192
Electron transport in fast dielectric liquids at high applied electric fields
[DE90-009815] N92-12606

LIQUIDUS
A liquidus phase diagram for a primitive shergottite N92-12916

LITHIUM
Fabrication and assembly of BOLVAPS (boil-off lithium vapor source) ceramic-option half anodes
[DE90-012012] N92-12661
A laser-produced lithium ion source for pulsed-power inertial confinement fusion
[DE90-013401] N92-12702

LITHIUM COMPOUNDS
Measurements of heat and mass transfer coefficients during absorption of water vapor by lithium bromide and (Li,K,Na)NO3 mixtures
[DE91-014212] N92-12088

LITHIUM HYDRIDES
Nuclear power engineering in space
[DE90-012743] N92-12656

LITHIUM OXIDES
Molten carbonate fuel cell research
[DE90-013896] N92-12120

LOADS (FORCES)
On the limitations of Froude's actuator disc concept
[ETN-91-90136] N92-11973
Determination of the effects of wind-induced vibration on cylindrical beams
[NASA-TM-103824] N92-12300
Composite load spectra for select space propulsion structural components
[NASA-CR-189048] N92-12306
Electromagnetic loads on ITER in-vessel components
[DE92-000672] N92-12739

LOCAL AREA NETWORKS
Networking as a Strategic Tool, 1991
[NASA-CR-188124] N92-12497
Networking standards N92-12499
Performance analysis of LAN bridges and routers N92-12501
Cooperative processing data bases N92-12505
MTX (Microwave Tokamak Experiment) data acquisition and analysis computer network
[DE90-013066] N92-12694

LOGIC CIRCUITS
Optimal realization of multistage cascade circuits
[ETN-91-90165] N92-12182
The energy complexity of threshold and other functions (preliminary version)
[CWI-CS-R9101] N92-12186
The behavior and testing implications of CMOS IC logic gate open circuits
[DE91-018679] N92-12189

LOGIC DESIGN
Program calculation properties of continuous algebras
[CWI-CS-R9104] N92-12484

LOGIC PROGRAMMING
Embedding as a tool for language comparison
[CWI-CS-R9102] N92-12483
Program calculation properties of continuous algebras
[CWI-CS-R9104] N92-12484
Modular properties of conditional term rewriting systems
[CWI-CS-R9105] N92-12485
Reasoning with uncertain and incomplete information in aerospace applications N92-12544

LOGISTICS
Information logistics: A production-line approach to information services N92-12506
A development-memory approach for enhancing avionics software logistics N92-12540

LOGISTICS MANAGEMENT
Information logistics: A production-line approach to information services N92-12506

LONG DURATION EXPOSURE FACILITY
The composition of meteoroids impacting LDEF N92-12910
Imaging analysis of LDEF craters N92-12927

LOW ASPECT RATIO
On simple aerodynamic sensitivity derivatives for use in interdisciplinary optimization
[NASA-TM-104145] N92-11985

LOW DENSITY WIND TUNNELS
Compression ramp in rarefied gas
[RC-90-08] N92-11978

LOW GRAVITY MANUFACTURING
Materials processing in low gravity
[NASA-CR-184213] N92-12139
Modifications to the rapid melt/rapid quench and transparent polymer video furnaces for the KC-135
[NASA-CR-184215] N92-12231
Welding in Space Workshop
[NASA-CR-184234] N92-12269

LOW TEMPERATURE
Low temperature annealing and cathodoluminescence studies of type 1 chondrule compositions N92-12913

LUBRICANTS
Material and lubricant relationships in the tribology of internal combustion engines
[DE92-000674] N92-12284

LUMINAIRES
Maintaining optimum light output with a thermally conductive heat pipe
[DE90-012423] N92-12195

LUMINESCENCE
Solid state radioluminescent sources using tritium-loaded zeolites
[DE91-019061] N92-12759

LUMINOSITY
Infrared studies of star formation in the rho Ophiuchi dark cloud N92-12790
Extragalactic x ray source counts N92-12967

LUNAR ATMOSPHERE
Studies of extended planetary atmospheres N92-12822
Observational studies of the exospheres of the Moon and Mercury N92-12839
Sodium and potassium in the lunar atmosphere N92-12884

LUNAR CRUST
Relationships among basaltic lunar meteorites N92-12922

LUNAR ENVIRONMENT
Welding in Space Workshop
[NASA-CR-184234] N92-12269

LUNAR GEOLOGY
Relationships among basaltic lunar meteorites N92-12922

LUNAR OCCULTATION
Infrared speckle interferometry and spectroscopy of Io N92-12820

LUNAR PROBES
An integrated energy approach to providing power and propulsion for the Space Exploration Initiative
[DE92-000143] N92-12054

LUNAR ROCKS
Method for producing oxygen from lunar materials
[NASA-CASE-MSC-21759-1] N92-12079
Relationships among basaltic lunar meteorites N92-12922

LUNAR SOIL
Method for producing oxygen from lunar materials
[NASA-CASE-MSC-21759-1] N92-12079
The origin of amorphous rims on lunar plagioclase grains: Solar wind damage or vapor condensates N92-12918
Relationships among basaltic lunar meteorites N92-12922

LUNGS
Mathematical morphology and active contour model: A cooperative approach of lung contours in CT
[TELECOM-PARIS-91-C-004] N92-12405

LYMPHOCYTES
Cosmos-1989 immunology studies
[NASA-CR-188970] N92-12389

M

MACHINE LEARNING
Machine learning: An approach based on classifier systems and evolutionary algorithms
[REPT-90-043] N92-12550
A bootstrapping approach to robot intelligence: First results
[REPT-90-068] N92-12552
New perspectives about default hierarchies formation in learning classifier systems
[REPT-91-002] N92-12553

MACHINING
The EDM surface: Topography, chemistry, and metallurgy
[DE91-017756] N92-12110

MACROPHAGES
Effect of space flight on interferon production - mechanistic studies
[NASA-CR-188972] N92-12390

MAGAZINES (SUPPLY CHAMBERS)
Development of a non-propagating explosives storage cabinet
[DE91-017923] N92-12148

MAGELLAN SPACECRAFT (NASA)
Goldstone solar system radar N92-12873

MAGELLANIC CLOUDS
Hydrodynamic study of Supernova 1987A: The phase of a wave of cooling and recombination N92-12973

MAGNESIUM OXIDES
Molten carbonate fuel cell research
[DE90-013896] N92-12120

MAGNETIC COILS
Channel cooling-techniques for repetitively pulsed magnetic switches
[DE90-013077] N92-12165

MAGNETIC COMPRESSION
The repetitive high energy pulsed power module
[DE90-013076] N92-12164

MAGNETIC CONTROL
West European magnetic confinement fusion research
[DE90-010911] N92-12704

MAGNETIC CORES
The repetitive high energy pulsed power module
[DE90-013076] N92-12164
Channel cooling-techniques for repetitively pulsed magnetic switches
[DE90-013077] N92-12165

MAGNETIC DIPOLES
Spin-exchange and dipole relaxation rates in atomic hydrogen: Rigorous and simplified calculations N92-12622
Spin-polarized atomic hydrogen in very strong magnetic fields N92-12626
An update on passive correctors for the SSC dipole magnets
[DE92-000649] N92-12669
On the evolution of pulsars N92-12935

MAGNETIC EFFECTS
Effect of the equilibrium magnetic field on plasma edge fluctuations
[DE90-012720] N92-12692

MAGNETIC FIELD CONFIGURATIONS
Calculated non-linear magnetic field penetration of plasma opening switches
[DE90-013156] N92-12166

Effect of the equilibrium magnetic field on plasma edge fluctuations
[DE90-012720] N92-12692
Magnetic field structure near the plasma boundary in helical systems and divertor tokamaks
[NIFS-17] N92-12708
The last disconnection events in Comet Halley in April 1986 N92-12862
The formation, structure and dissipation of direct electric current systems in the solar atmosphere N92-12979

MAGNETIC FIELD RECONNECTION
Total magnetic reconnection during a tokamak major disruption
[DE90-014711] N92-12706
Evolution on large-scale plasma structures in comets: Kinematics and physics N92-12801

MAGNETIC FIELDS
Calculated non-linear magnetic field penetration of plasma opening switches
[DE90-013156] N92-12166
Computation of magnetic suspension of maglev systems using dynamic circuit theory
[DE91-017973] N92-12280
Chemical release and radiation effects experiment advanced planned
[NASA-CR-184229] N92-12360
Immunological and biochemical effects of 60 Hz electric and magnetic fields in humans
[DE90-012546] N92-12402
Immunological and biochemical effects of 60 Hz electric and magnetic fields in humans
[DE90-012547] N92-12403
A computer program for the 2-D magnetostatic problem based on integral equations for the field of the conductors and boundary elements
[DE92-000130] N92-12596
First order tune shift calculations for transverse betatron dynamics
[DE92-000370] N92-12668
Magnetic field in the SSC arc quad
[DE92-000656] N92-12670
Principles of superconductor imaging surface gradiometry
[DE90-008916] N92-12740
The performance of a superconducting micro-undulator prototype
[DE90-012639] N92-12743
A simple model for localized-itinerant magnetic systems: Crystal field effects
[DE90-625399] N92-12746
Phase diagram of anisotropic two-dimensional quarter-filled band of interacting electrons
[DE90-013171] N92-12748
The flux jumps in high Tc Bi(1.7)Pb(0.3)Sr2 Ca2Cu3O(y) bulk superconductor
[DE91-628641] N92-12760
Nonthermal synchrotron pair cascades in strong magnetic fields: A gamma ray burst emission model N92-12899

MAGNETIC FLUX
The formation, structure and dissipation of direct electric current systems in the solar atmosphere N92-12979

MAGNETIC MEASUREMENT
Measurement of magnetic fluctuations at small spatial scales in the Tokapole 2 tokamak
[DE92-000161] N92-12728

MAGNETIC MOMENTS
The spin down of the radio pulsars: Braking index N92-12936

MAGNETIC PERMEABILITY
Effect of cooling rate on the transition temperature in Bi-Pb-Sr-Ca-Cu-O system
[DE91-628643] N92-12762

MAGNETIC PROPERTIES
A simple model for localized-itinerant magnetic systems: Crystal field effects
[DE90-625399] N92-12746

MAGNETIC RELAXATION
Spin-exchange and dipole relaxation rates in atomic hydrogen: Rigorous and simplified calculations N92-12622

MAGNETIC RESONANCE
Cardiac magnetic resonance imaging by retrospective gating: Mathematical modelling and reconstruction algorithms
[CWI-AM-R9024] N92-12408
Resonances in recombination of atomic hydrogen due to long-range H3 molecular states N92-12627

MAGNETIC SPECTROSCOPY
A fast online event display for a high intensity fixed-target spectrometer
[DE90-012047] N92-12443

MAGNETIC STARS
Manifestations of dynamo driven large-scale magnetic field in accretion disks of compact objects N92-12940

MAGNETIC STORMS
On the vulnerability of electric power to geomagnetic storms
[DE90-013929] N92-12368

MAGNETIC SUSPENSION
Computation of magnetic suspension of maglev systems using dynamic circuit theory
[DE91-017973] N92-12280

MAGNETIZATION
An update on passive correctors for the SSC dipole magnets
[DE92-000649] N92-12669
Evidence of weak pair coupling in the penetration depth of bi-based high-Tc superconductors
[DE90-009415] N92-12741
Magnetization studies of irradiation modified single crystal Y1Ba2Cu3O7 superconductors: Flux creep and annealing effects
[DE91-018858] N92-12758

MAGNETO-OPTICS
Design and testing of 3-level optimal correlation filters
[DE91-019059] N92-12685

MAGNETOHYDRODYNAMIC GENERATORS
Magnetohydrodynamic projects at the CDIF
[DE92-000396] N92-12735

MAGNETOHYDRODYNAMIC STABILITY
Stochastic and collisional diffusion in two-dimensional periodic flows
[DE90-014335] N92-12198
Richtmyer-Meshkov instability of shocked gaseous interfaces
[DE92-000308] N92-12225
Finite orbit energetic particle linear response to toroidal Alfven Eigenmodes
[DE91-018418] N92-12612
Measurements of laser wavelength scaling ion acoustic decay instability and associated effects in laser-plasma interaction experiments
[DE90-011434] N92-12691
Plasma properties
[DE90-012865] N92-12693
Studies of fine structure of discharge region on HT-6B tokamak device
[DE91-628421] N92-12723
An algorithm for determining EF coils from fixed-boundary equilibria applied to ARIES 3
[DE92-000170] N92-12730

MAGNETOHYDRODYNAMIC TURBULENCE
Effect of the equilibrium magnetic field on plasma edge fluctuations
[DE90-012720] N92-12692
Resistive MHD turbulence
[DE90-012935] N92-12700

MAGNETOHYDRODYNAMIC WAVES
Finite orbit energetic particle linear response to toroidal Alfven Eigenmodes
[DE91-018418] N92-12612
Plasma properties
[DE90-012865] N92-12693

MAGNETOHYDRODYNAMICS
Compendium of MHD-related terminology
[DE90-012867] N92-12699
The need for superconducting magnets for MHD seawater propulsion
[DE90-013651] N92-12705
Magnetohydrodynamic cellular automata
[NIFS-16] N92-12707
Magnetohydrodynamic projects at the CDIF
[DE92-000396] N92-12735

MAGNETOSPHERES
Global scale auroral emissions on Jupiter N92-12891

MAGNETRON SPUTTERING
PVD layers for corrosion protection of high strength Al-alloys
[MBB-Z-0360-91-PUB] N92-12108

MAGNETS
Optimization on AmPS chicane magnets
[NIKHEF-K-AMPS/91-02] N92-12595
A computer program for the 2-D magnetostatic problem based on integral equations for the field of the conductors and boundary elements
[DE92-000130] N92-12596

MAGNITUDE
Asteroid absolute magnitudes and slope parameters N92-12888

MAIN SEQUENCE STARS
The evolution of young stellar object disks and their environment N92-12847
Nearby main sequence stars with cool circumstellar material N92-12904
A guide to the use of theoretical models of the solar nebula for the interpretation of the meteoritic record N92-12912

MAINTENANCE
Current programmes of Metallurgy Division, 1991
[DE91-634904] N92-12104
Designing equipment for use in gamma radiation environments
[DE90-012050] N92-12162
Decision support system development using a migration approach
[DE91-018860] N92-12774
Goldstone solar system radar N92-12824

MAJORITY CARRIERS
Charge states of donor-hydrogen pairs in Si: A fragile balance
[DE91-018794] N92-12757

MAN ENVIRONMENT INTERACTIONS
Report of a workshop on using remote sensing to estimate land use change
[DE90-011278] N92-12318
Ecological Research between the Univ. of Georgia and DOE. Volume 1: Main report
[DE90-012109] N92-12341
Global climate change and human health: Information needs, research priorities, and strategic considerations
[DE90-012599] N92-12342

MAN MACHINE SYSTEMS
Advanced technologies for Mission Control Centers N92-12028
Helmet mounted sight and display testing
[MBB-UD-0594-91-PUB] N92-12421
Helicopter integrated helmet requirements and test results
[MBB-UD-0595-91-PUB] N92-12422

MAN TENDED FREE FLYERS
Launch site operations for Columbus Free Flyer and resupply mission
[MBB-UO-0153-91-PUB] N92-12034
MTFF operations
[MBB-UO-0075-91-PUB] N92-12043
The Columbus Free Flying Laboratory: Mechanical design aspects
[MBB-UO-0152-91-PUB] N92-12044
Columbus Free Flying Laboratory (MTFF) logistics, transportation, and ground processing
[MBB-UO-0155-91-PUB] N92-12589

MAN-COMPUTER INTERFACE
Planning and reasoning in the JPL telerobot testbed
[NASA-CR-189038] N92-12278
The effect of on/off indicator design on state confusion, preference, and response time performance, executive summary
[NASA-CR-185662] N92-12416
NFS as a user interface to a high-performance data system
[DE92-000254] N92-12515
Integrating machine intelligence into the cockpit to aid the pilot N92-12533
Supervisory autonomy in telerobotics
[NRC-31743] N92-12546

MANAGEMENT ANALYSIS
Cross-functional systems N92-12504

MANAGEMENT INFORMATION SYSTEMS
Information logistics: A production-line approach to information services N92-12506

MANAGEMENT METHODS
Requirements and traceability management N92-12453
Cross-functional systems N92-12504
Information logistics: A production-line approach to information services N92-12506
Modular organization of domestic care in Weert (Netherlands)
[ISBN-90-6757-045-1] N92-12772

MANAGEMENT SYSTEMS
Coprocessor support for real-time Ada N92-12454
Using NetMaster to manage IBM networks N92-12500
Information logistics: A production-line approach to information services N92-12506
Machine intelligence for survivable communications network management N92-12518
A threat management system N92-12535

MANEUVERABLE SPACECRAFT
Control center operations at the Goddard Space Flight Center N92-12023

MANGANESE ISOTOPES
Olivines in angrite LEW 87051: Phenos or xenos N92-12924

MANIPULATORS
Stiffness control of teleoperators with redundant, dissimilar kinematics
[DE90-011642] N92-12265
Three-dimensional elastodynamic modeling and analysis of a flexible robot manipulator N92-12271
Heuristic methods for optimal trajectory planning of robotic manipulators N92-12272
A unified motion planning approach for redundant and non-redundant manipulators with actuator constraints
[NASA-CR-189002] N92-12274

A unified motion planning approach for redundant and non-redundant manipulators with actuator constraints [NASA-CR-189023] N92-12276
Planning and reasoning in the JPL telerobot testbed [NASA-CR-189036] N92-12278
MANNED REENTRY
Compression ramp in rarefied gas [RC-90-08] N92-11978
MANPOWER
Columbus Free Flyer Center: Tasks and manpower profiles [MBB-UO-0154-91-PUB] N92-12588
MANUALS
Manual for a pattern generator [LINO-1991-2] N92-12665
MANUFACTURING
Recent trends in waste-reduction efforts in the US manufacturing sector [DE92-000197] N92-12357
Using computer experiments to construct a cheap substitute for an expensive simulation model --- application to a compression molding process [DE92-000421] N92-12494
MANY BODY PROBLEM
Constraint treatment techniques and parallel algorithms for multibody dynamic analysis N92-12297
Reciprocity theory of many-body interactions [IC-AERO-90-01] N92-12620
MAPPING
Geologic mapping of tunnels using photogrammetry-control-point configuration [DE91-019071] N92-12323
MARIA
Relationships among basaltic lunar meteorites N92-12922
MARINE BIOLOGY
Concluding remarks: Promises and limitations of individual cell and particle analysis [DE91-016900] N92-12381
MARINE PROPULSION
The need for superconducting magnets for MHD seawater propulsion [DE90-013651] N92-12705
MARINE TECHNOLOGY
Ocean energy contract list, fiscal year 1990 [DE91-002177] N92-12333
MARINER 7 SPACE PROBE
Ground based infrared measurements of the global distribution of ozone in the atmosphere of Mars N92-12875
MARKETING
Information logistics: A production-line approach to information services N92-12506
MARKOV PROCESSES
Central limit theorem for non-homogeneous processes with independent increments and semimarkov switchings [CWI-AM-R9026] N92-12564
Time-reversion of a hybrid state stochastic difference system [NLT-TP-89014-U] N92-12585
MARS (PLANET)
Arecibo S-band radar program N92-12803
The 1990 MB: The first Mars Trojan N92-12861
Radar studies in the solar system N92-12886
Nd-142/Nd-144 in SNCs and early differentiation of a heterogeneous Martian mantle N92-12925
Iddingsite in the Nakhla meteorite: TEM study of mineralogy and texture of pre-terrestrial (Martian?) alterations N92-12929
MARS ATMOSPHERE
Studies of extended planetary atmospheres N92-12822
Ground based infrared measurements of the global distribution of ozone in the atmosphere of Mars N92-12875
MARS PROBES
An integrated energy approach to providing power and propulsion for the Space Exploration Initiative [DE92-000143] N92-12054
MARS SATELLITES
Radar investigation of asteroids and planetary satellites N92-12837
MARS SURFACE
Degradation studies of Martian impact craters N92-12905
MARTINGALES
Time-reversion of a hybrid state stochastic difference system [NLT-TP-89014-U] N92-12585
MASERS
Influence of wave-particle interactions on solar flare dynamics N92-12978
MASS SPECTRA
Precision experiments in electroweak interactions [DE90-013568] N92-12607
Kinematic measurement of alpha particles accompanied by spontaneous fission of Cf-252 [ETN-91-90175] N92-12618
MASS SPECTROSCOPY
Resonance ionization mass spectrometry for materials analysis and characterization [DE90-013187] N92-12077
MASS TRANSFER
Measurements of heat and mass transfer coefficients during absorption of water vapor by lithium bromide and (Li,K,Na)NO3 mixtures [DE91-014212] N92-12088
Heat transfer between stratified liquids with bubbling across the interface [DE90-008579] N92-12192
Implementation of a modified Johnson and Hindmarsh mass and energy model [DE90-000488] N92-12329
MASSIVELY PARALLEL PROCESSORS
Neural network solutions to mathematical models of parallel search for optimal trajectory generation N92-12527
MATERIALS RECOVERY
Catalysis and biocatalysis program [NASA-CR-189452] N92-12392
MATHEMATICAL MODELS
Study of hypersonic flow turbulence models [CERT-RF-36/5005-32] N92-11971
On the limitations of Froude's actuator disc concept [ETN-91-90136] N92-11973
Practical input optimization for aircraft parameter estimation experiments N92-11989
A differential charging model for synchronous satellites N92-12041
Optimal control of large space structures using distributed gyricity: A continuum approach [UTIAS-341] N92-12042
Spatial variability in the tensile strength of an extruded nuclear-grade graphite [DE91-018868] N92-12070
The calculation of theoretical coherent anti-Stokes Raman spectra [NRC-29810] N92-12085
Diffraction by macromolecular fluids [DE91-016219] N92-12089
Alternative motor fuel use model: Model theory and design and user's guide [DE90-012040] N92-12134
Internal dynamics of electrical discharges [DE90-013161] N92-12169
Compact modeling of the dynamic behaviour of MOSFETs [ISBN-90-9004212-1] N92-12176
Numerical and experimental study of curved and planar frequency selective surfaces with arbitrary illumination [NASA-TM-104540] N92-12185
TURCOM: A computer code for the calculation of transient, multi-dimensional, turbulent, multi-component chemically reactive fluid flows. Part 2: Compressible and combusting flow [NRC-29287-PT-2] N92-12214
Laserable KrF(*)-excimer discharge with integrated preionization [ETN-91-90177] N92-12253
Computation of magnetic suspension of maglev systems using dynamic circuit theory [DE91-017973] N92-12280
Computer modeling of arc welds to predict effects of critical variables on weld penetration [DE92-000428] N92-12283
Sensory processing and world modeling for an active ranging device [NASA-CR-188915] N92-12319
A standard test set for numerical approximations to the shallow water equations in spherical geometry [DE92-000385] N92-12365
Simulating climate with two different numerical schemes [DE90-011777] N92-12367
VIERS-1, part 2: Completion of the laboratory experiments [BCRS-90-27] N92-12378
Ocean/bottom acoustic interaction with arbitrary bottom profile [FFI-91/7009] N92-12386
Mathematical morphology and active contour model: A cooperative approach of lung contours in CT [TELECOM-PARIS-91-C-004] N92-12405
Cardiac magnetic resonance imaging by retrospective gating: Mathematical modelling and reconstruction algorithms [CWI-AM-R9024] N92-12408
Automatic programming of simulation models [NASA-CR-184221] N92-12448
Generalized finite element gap model [AD-A240559] N92-12471
Solving stochastic linear programs on a hypercube multicomputer [AD-A240630] N92-12472
Displacement ranks and fast algorithms [TELECOM-PARIS-91-E-001] N92-12474
Using computer experiments to construct a cheap substitute for an expensive simulation model --- application to a compression molding process [DE92-000421] N92-12494
Neural network solutions to mathematical models of parallel search for optimal trajectory generation N92-12527
Energy models for one-carrier transport in semiconductor devices [NASA-CR-189046] N92-12557
Efficient multi-dimensional upwinding for the steady Euler equations [CWI-NM-R9107] N92-12570
A minimum prediction error algorithm for estimation of periodic ARMA models [REPT-90-016] N92-12573
Requirements and possible technical solutions derived from the new airmobility concept of the German Army [MBB-UD-0596-91-PUB] N92-12590
Theoretical nuclear physics [DE92-000022] N92-12615
Effect of the equilibrium magnetic field on plasma edge fluctuations [DE90-012720] N92-12692
The need for superconducting magnets for MHD seawater propulsion [DE90-013651] N92-12705
On the theory of impulse breakdown in gases [NRC-31510] N92-12711
Simple model of the gaseous plasma and its soliton solutions [NRC-30824] N92-12712
Interpretation of ion energy spectra of laser plasmas, by recombination model [ETN-91-90170] N92-12713
Phase diagram of anisotropic two-dimensional quarter-filled band of interacting electrons [DE90-013171] N92-12748
Spectral factorization of linear periodic systems with application to the optimal prediction of periodic ARMA models [REPT-90-013] N92-12768
Decision support system development using a migration approach [DE91-018860] N92-12774
Forecast of transportation energy demand through the year 2010 [DE92-000222] N92-12788
Radiative transfer in planetary atmospheres N92-12842
Laboratory simulation of the surface of Halley's Comet N92-12872
A guide to the use of theoretical models of the solar nebula for the interpretation of the meteoritic record N92-12912
Neutron starquake model for gamma-ray bursts N92-12938
MATRICES (MATHEMATICS)
Smoothed Runge-Kutta methods in the method of lines [CWI-NM-R9101] N92-12565
MAXIMUM LIKELIHOOD ESTIMATES
Life testing and reliability with application in engineering systems [AD-A240042] N92-12287
MEAN SQUARE VALUES
Segmentation of complex geometric forms by the curvature method [NRC-31210] N92-12475
MEASURING INSTRUMENTS
Heat transfer and instrumentation studies on rotating turbine blades in a transient facility N92-12203
Lagrangian analysis, data covariance, and the impulse time integral [DE92-000169] N92-12224
Linearisation of diode detectors for use in a multistate reflectometer [NPL-DES-104] N92-12241
Large Hadron Collider Workshop. Volume 2: Proceedings [DE91-634595] N92-12663
The multipulse Thomson scattering diagnostic on the D3-D tokamak [DE92-000262] N92-12732
MECHANICAL DRIVES
Preliminary analysis of baseline vibration data from Allison T56-A-14FE engine and reduction gearbox [NRC-31578] N92-11999

MECHANICAL ENGINEERING
The Columbus Free Flying Laboratory: Mechanical design aspects
[MBB-UO-0152-91-PUB] N92-12044
MECHANICAL IMPEDANCE
Variable impedance journal bearings for rotor-bearing systems N92-12270
MECHANICAL PROPERTIES
A brief review of wrought aluminum alloy metal matrix composites reinforced by silicon carbide whiskers
[NRC-LTR-ST-1765] N92-12058
Theoretical and experimental analysis of the fine mechanical behavior of a glued assembly with double slanting layers
[ETN-91-90277] N92-12068
Detailed behavior of a glued double layer assembly in terms of the shearing-off of joint covers N92-12069
Strength evaluation for modified 12Cr steel and A286 steel of USC turbine rotor materials
[DE90-503033] N92-12099
Current programmes of Metallurgy Division, 1991
[DE91-634904] N92-12104
Selected methods for the investigation of linear, continuous and discrete-continuous mechanical models of a rail
[ILR-MITT-261(1991)] N92-12277
Identification of the mechanical behavior of solid materials
[ISBN-90-386-0041-0] N92-12304
MEDICAL ELECTRONICS
Pattern recognition in biosignals. Application to the sigma spindles in sleep electroencephalograms
[ETN-91-90166] N92-12407
MELTING
Modifications to the rapid melt/rapid quench and transparent polymer video furnaces for the KC-135
[NASA-CR-184215] N92-12231
MELTS (CRYSTAL GROWTH)
Stoichiometry and irradiation effects in melt grown Tl-Ca-Ba-Cu-O single crystals
[DE90-013365] N92-12749
An analysis of thermosolutal convection during the crystal growth of CdTe from Te solution by the THM
[REPT-911-430-135] N92-12755
Dynamic crystallization characteristics of enstatite chondrite chondrules N92-12923
Olivines in angrite LEW 87051: Phenos or xenos N92-12924
MEMORY (COMPUTERS)
Some methods of encoding simple visual images for use with a sparse distributed memory, with applications to character recognition
[NASA-CR-188848] N92-12436
An empirical investigation of sparse distributed memory using discrete speech recognition
[NASA-CR-187893] N92-12437
Integrated, non-volatile, high-speed analog random access memory
[NASA-CASE-NPO-17998-1-CU] N92-12438
Los Alamos National Laboratory's high-performance data system
[DE92-000223] N92-12442
Requirements for a network storage service in a supercomputer environment
[DE92-000245] N92-12513
NFS as a user interface to a high-performance data system
[DE92-000254] N92-12515
MERCURY (METAL)
Mercury as an environmental pollutant
[DE90-013392] N92-12349
MERCURY (PLANET)
Radar studies in the solar system N92-12886
MERCURY ATMOSPHERE
Observational studies of the exospheres of the Moon and Mercury N92-12839
MESOSCALE PHENOMENA
Three-dimensional forecasting models on a desk-top computer
[DE90-010612] N92-12347
MESSAGE PROCESSING
Optimality conditions for minimax tasks: An application example from communications engineering
[ETN-91-90169] N92-12156
METAL COATINGS
PVD layers for corrosion protection of high strength Al-alloys
[MBB-Z-0360-91-PUB] N92-12108
METAL FILMS
Fabrication and assembly of BOLVAPS (boil-off lithium vapor source) ceramic-option half anodes
[DE90-012012] N92-12661
The role of inhibitors during electrodeposition of thin metallic films
[DE90-014177] N92-12750
METAL HYDRIDES
Hydrogen isotopic exchange over palladium metal
[DE90-012063] N92-12076
METAL IONS
A process for preparing an assembly of an article and a soluble polyimide which resists dimensional change, delamination, and debonding when exposed to changes in temperature
[NASA-CASE-LAR-14763-1] N92-12121
Atomic and molecular data for metallic impurities in fusion plasmas
[DE90-012213] N92-12688
A laser-produced lithium ion source for pulsed-power inertial confinement fusion
[DE90-013401] N92-12702
METAL MATRIX COMPOSITES
A brief review of wrought aluminum alloy metal matrix composites reinforced by silicon carbide whiskers
[NRC-LTR-ST-1765] N92-12058
METAL OXIDE SEMICONDUCTORS
Compact modeling of the dynamic behaviour of MOSFETs
[ISBN-90-9004212-1] N92-12176
METAL PLATES
Fatigue crack propagation rates of experimental aluminum lithium sheet and plate alloys
[ESDU-91015] N92-12102
The effect of berming on the response of structures subjected to nearby detonations
[FFI-91/4005] N92-12310
METAL SHEETS
Fatigue crack propagation rates of experimental aluminum lithium sheet and plate alloys
[ESDU-91015] N92-12102
Design, manufacture, and calibration of Foucault current sensors
[DCR/M-51739/F-90] N92-12235
METAL VAPORS
Fabrication and assembly of BOLVAPS (boil-off lithium vapor source) ceramic-option half anodes
[DE90-012012] N92-12661
METALLIC GLASSES
Neutron Brillouin scattering in a metallic glass
[DE92-000219] N92-12642
METALLIC PLASMAS
A laser-produced lithium ion source for pulsed-power inertial confinement fusion
[DE90-013401] N92-12702
METALLOGRAPHY
Failure analysis of turbine blades
[DE91-631513] N92-12282
METALS
Current programmes of Metallurgy Division, 1991
[DE91-634904] N92-12104
Metallic corrosion: Causes and case histories
[NRC-LTR-ST-1798] N92-12105
METASTABLE STATE
Charge states of donor-hydrogen pairs in Si: A fragile balance
[DE91-018794] N92-12757
Can a man-made universe be achieved by quantum tunneling without an initial singularity? N92-12951
METEORITE COLLISIONS
Planetary astronomy N92-12863
METEORITE CRATERS
Abstracts for the 54th Annual Meeting of the Meteoritical Society
[NASA-CR-188934] N92-12901
Degradation studies of Martian impact craters N92-12905
Ar-39-Ar-40 of achondrites: Evidence for a lunar-like cataclysm N92-12907
METEORITES
Infrared spectral studies of asteroids N92-12796
Abstracts for the 54th Annual Meeting of the Meteoritical Society
[NASA-CR-188934] N92-12901
Mineralogy of an unusual Cr-rich inclusion in the Los Martinez (L6) chrondritic breccia N92-12909
Distribution of silicon between kamacite and taenite N92-12911
A guide to the use of theoretical models of the solar nebula for the interpretation of the meteoritic record N92-12912
Extraterrestrial water of possible Martian origin in SNC meteorites: Constraints from oxygen isotopes N92-12917
METEORITIC COMPOSITION
Compositional studies of primitive asteroids N92-12853
Asteroid 1986 DA: Radar evidence for a metallic composition N92-12882
Abstracts for the 54th Annual Meeting of the Meteoritical Society
[NASA-CR-188934] N92-12901
Interstellar organics and possible connections with the carbonaceous components of meteorites and IDPs N92-12902
Ar-39-Ar-40 of achondrites: Evidence for a lunar-like cataclysm N92-12907
Distribution of silicon between kamacite and taenite N92-12911
Low temperature annealing and cathodoluminescence studies of type 1 chondrule compositions N92-12913
A liquidus phase diagram for a primitive shergottite N92-12916
Extraterrestrial water of possible Martian origin in SNC meteorites: Constraints from oxygen isotopes N92-12917
Evaluation of the Strecker synthesis as a source of amino acids on carbonaceous chondrites N92-12920
Microprobe studies of microtomed particles of white druse salts in shergottite EETA 79001 N92-12921
Relationships among basaltic lunar meteorites N92-12922
Dynamic crystallization characteristics of enstatite chondrite chondrules N92-12923
Olivines in angrite LEW 87051: Phenos or xenos N92-12924
Nd-142/Nd-144 in SNCs and early differentiation of a heterogeneous Martian mantle N92-12925
Iddingsite in the Nakhla meteorite: TEM study of mineralogy and texture of pre-terrestrial (Martian?) alterations N92-12929
Carbonate and sulfate minerals in the Chassigny meteorite N92-12930
Mineralogy and matrix composition of CR chondrites Renazzo and EET 87770, and ungrouped chondrites Essebi and MAC 87300 N92-12932
METEORITIC DAMAGE
The composition of meteoroids impacting LDEF N92-12910
METEORITIC MICROSTRUCTURES
Abstracts for the 54th Annual Meeting of the Meteoritical Society
[NASA-CR-188934] N92-12901
METEOROIDS
The composition of meteoroids impacting LDEF N92-12910
METEOROLOGICAL INSTRUMENTS
A PC-based telemetry system for acquiring and reducing data from multiple PCM streams
[DE91-002199] N92-12037
METEOROLOGICAL PARAMETERS
Atmospheric environment for Space Shuttle (STS-37) launch
[NASA-TM-103556] N92-12375
METHANE
A study of the temporal behavior of the vertical structure of Jupiter's atmosphere N92-12976
METHYL ALCOHOL
Probe molecule studies: Active species in alcohol synthesis
[DE92-000332] N92-12138
Methanol in the sky with diamonds N92-12903
MICROANALYSIS
Distribution of silicon between kamacite and taenite N92-12911
Microprobe studies of microtomed particles of white druse salts in shergottite EETA 79001 N92-12921
MICROCOMPUTERS
MacSPOC: Orbital trajectory calculations on a laptop computer N92-12027
Advanced laptop and small personal computer technology N92-12029
Full surface testing of grazing incidence mirrors
[AD-A240356] N92-12676
MICROELECTRONICS
Microsensor research
[DE90-011801] N92-12227
Fast Optically Sensitive Segmented Array (FOSSA)
[DE91-018997] N92-12684
MICROHARDNESS
Vickers microindentation toughness of a sintered SiC in the median-crack regime
[DE92-000225] N92-12132
MICROORGANISMS
Concluding remarks: Promises and limitations of individual cell and particle analysis
[DE91-016900] N92-12381
MICROPARTICLES
Simultaneous determination of optical and thermodynamic properties of an evaporating aqueous solution droplet
[DE90-010652] N92-12767
MICROPHONES
Vacuum-isolation vessel and method for measurement of thermal noise in microphones
[NASA-CASE-LAR-14567-1-CU] N92-12174

MICROPROCESSORS
Unattended optical surveillance equipment
[DE90-013403] N92-12228
A special function coprocessor for level-2
[DE90-013327] N92-12435
High energy SEU test results for the commercially available MIPS R3000 microprocessor and R3010 floating point unit
[DE91-019019] N92-12441
Coprocessor support for real-time Ada N92-12454
MICROSTRIP ANTENNAS
A synthesis process for the optimization of the radiation properties of microstrip antennas
[ETN-91-90155] N92-12155
MICROSTRUCTURE
A brief review of wrought aluminum alloy metal matrix composites reinforced by silicon carbide whiskers
[NRC-LTR-ST-1765] N92-12058
Structures and fracture mechanic of brittle matrix composites
[REPT-911-430-131] N92-12064
Designing precipitation-strengthened iron-aluminides for high-temperature applications
[DE90-013832] N92-12100
Controlled microstructure oxide coating for chemical sensors
[DE90-012223] N92-12119
Mechanical properties and microstructure of pressureless sintered duophase sialon
[DE92-000043] N92-12131
A feasibility study of using ABAQUS finite element analysis for creep with microstructural material damage
[NRC-LTR-ST-1791] N92-12305
MICROTRONS
Examination of excitation and decay of giant resonances in Ca-40 by (e,e'x) coincidence experiments
[ETN-91-90174] N92-12617
MICROWAVE EMISSION
Influence of wave-particle interactions on solar flare dynamics N92-12978
MICROWAVE EQUIPMENT
MTX (Microwave Tokamak Experiment) data acquisition and analysis computer network
[DE90-013066] N92-12694
MTX (Microwave Tokamak Experiment) diagnostics and timing system for FEL (Free Electron Laser) heating experiments
[DE90-013067] N92-12695
MICROWAVE IMAGERY
Microwave remote sensing and radar polarization signatures of natural fields
[NASA-CR-189249] N92-12317
The sensitivity of synthetic aperture radiometers for remote sensing applications from space
[NASA-TM-100741] N92-12321
An atlas of monthly mean distributions of GEOSAT sea surface height, SSMI surface wind speed, AVHRR/2 sea surface temperature, and ECMWF surface wind components during 1988
[NASA-CR-189029] N92-12385
MICROWAVE RADIOMETERS
The sensitivity of synthetic aperture radiometers for remote sensing applications from space
[NASA-TM-100741] N92-12321
MICROWAVE REFLECTOMETERS
A numerically-stable algorithm for calibrating single six-ports for national microwave reflectometry
[NPL-DES-102] N92-12158
MICROWAVE SCATTERING
Microwave remote sensing and radar polarization signatures of natural fields
[NASA-CR-189249] N92-12317
MICROWAVE SENSORS
Microwave remote sensing and radar polarization signatures of natural fields
[NASA-CR-189249] N92-12317
MICROWAVE SPECTRA
Io's atmosphere detected by ground-based microwave spectroscopy N92-12859
MICROWAVE TUBES
New technology for linear colliders
[DE92-000081] N92-12664
MICROWAVES
Study of advanced techniques in modulation and coding for digital beam frequencies with large spectral effectiveness
[TELECOM-PARIS-90-E-020] N92-12152
Workshop on Artificially Ionized Layers in the Atmosphere
[DE90-013470] N92-12358
Trapping of neutral atoms with resonant microwave radiation N92-12623
Physics study of the application of an IFEL (Induction Free Electron Laser) to CIT (Compact Ignition Tokamak)
[DE90-011276] N92-12690
The large-scale surface brightness distribution of the x ray background N92-12961
MIGRATION
Decision support system development using a migration approach
[DE91-018860] N92-12774
MILITARY AVIATION
Military and civil software standards and guidelines for guidance and control N92-12452
MILITARY OPERATIONS
C3I graphical applications N92-12541
Requirements and possible technical solutions derived from the new airmobility concept of the German Army
[MBB-UD-0596-91-PUB] N92-12590
MILITARY SPACECRAFT
Advanced Satellite Workstation (ASW) N92-12521
MILITARY TECHNOLOGY
Software methodologies for safety critical systems N92-12467
Machine intelligence for survivable communications network management N92-12518
Requirements and possible technical solutions derived from the new airmobility concept of the German Army
[MBB-UD-0596-91-PUB] N92-12590
MILLIMETER WAVES
Galileo-related ground-based observations of the Jovian System N92-12798
MINERAL DEPOSITS
Aqueous alteration on the parent bodies of carbonaceous chondrites: Computer simulations of late-stage oxidation N92-12908
MINERALOGY
Infrared spectral studies of asteroids N92-12796
Mineralogy of an unusual Cr-rich inclusion in the Los Martinez (L6) chrondritic breccia N92-12909
Transmission electron microscopy of an interplanetary dust particle with links to CI chondrites N92-12919
Iddingsite in the Nakhla meteorite: TEM study of mineralogy and texture of pre-terrestrial (Martian?) alterations N92-12929
MINERALS
Analysis of minerals containing dissolved traces of the fluid phase components water and carbon dioxide
[NASA-CR-188993] N92-12083
Carbonate and sulfate minerals in the Chassigny meteorite N92-12930
Mineralogy and matrix composition of CR chondrites Renazzo and EET 87770, and ungrouped chondrites Essebi and MAC 87300 N92-12932
MINES (EXCAVATIONS)
Survey on possibility to utilize effectively underground space
[DE92-703044] N92-12417
MINES (ORDNANCE)
Chemical analysis of trace substances from explosives
[DE91-017833] N92-12084
MINIMAX TECHNIQUE
Optimality conditions for minimax tasks: An application example from communications engineering
[ETN-91-90169] N92-12156
MINORITY CARRIERS
Charge states of donor-hydrogen pairs in Si: A fragile balance
[DE91-018794] N92-12757
MIRRORS
An astigmatic unstable resonator with an intracavity deformable mirror
[DE91-018815] N92-12257
Large area laser conditioning of dielectric thin film mirrors
[DE90-013485] N92-12674
Full surface testing of grazing incidence mirrors
[AD-A240356] N92-12676
Effects of oxide layers on optical properties and x ray hardness of Al-Be mirrors
[DE92-000476] N92-12687
An analysis of grazing incidence metal mirrors in a laser ICF reactor driver
[DE92-000093] N92-12710
MISMATCH (ELECTRICAL)
Design and study of photon-assisted heteroepitaxial growth system
[LAAS-91187] N92-12753
MISSILE DEFENSE
Automated threat response recommendation in environments of high data uncertainty using the Countermeasure Association Technique (CMAT) N92-12525
MISSILES
Lift-curve slope of wing-body combinations
[ESDU-91007] N92-11968
Computer aided design of weapon system guidance and control with predictive functional control technique N92-12463
Analyst workbench N92-12464
Common Ada Missile Packages (CAMP) N92-12466
MISSION PLANNING
Planning systems for pioneer mission control N92-12021
Huntsville Operations Support Center N92-12024
Mission critical technology development N92-12031
Heuristic route optimization: A model for force level route planning N92-12520
Development of tactical decision aids N92-12532
Integrating machine intelligence into the cockpit to aid the pilot N92-12533
A threat management system N92-12535
C3I graphical applications N92-12541
MIXING
Heat transfer between stratified liquids with bubbling across the interface
[DE90-008579] N92-12192
Excess mixing volumes and specific interactions in organic molecule mixing
[ETN-91-90171] N92-12616
MIXING LENGTH FLOW THEORY
Turbulent boundary layer solution for two-dimensional compressible flow using mixing length and K-epsilon turbulence models
[AD-A233771] N92-12213
MIXTURES
Fractional crystallization in polymer mixing
[ETN-91-90184] N92-12129
Boiling inside tubes: Saturated wet-wall heat transfer with mixtures
[ESDU-91011] N92-12208
MODAL RESPONSE
Modal interaction in linear dynamic systems near degenerate modes
[NASA-TM-105315] N92-12316
MODEL REFERENCE ADAPTIVE CONTROL
Integration of model-based and sensor-based control for a two-link flexible robot arm
[DE90-012183] N92-12266
MODULARITY
Modular properties of conditional term rewriting systems
[CWI-CS-R9105] N92-12485
MODULATORS
A repetitive, one microsecond, thirty-five kilojoule, two hundred kilovolt pulse generator
[DE90-013063] N92-12167
Using AITEST to troubleshoot a Radar Modulator (RM) unit: A case study in the application of expert systems to intermediate-level testing N92-12537
MODULES
Using AITEST to troubleshoot a Radar Modulator (RM) unit: A case study in the application of expert systems to intermediate-level testing N92-12537
MODULUS OF ELASTICITY
Theory of inclusions in the elastic and elastic-plastic deformation of composite materials N92-12056
MOISTURE
Estimation of surface heat and moisture fluxes over a prairie grassland using a hybrid biosphere/remote sensing model N92-12320
MOJAVE DESERT (CA)
Environmental projects. Volume 13: Underground storage tanks, removal and replacement. Goldstone Deep Space Communications Complex
[NASA-CR-189030] N92-12035
MOLECULAR BEAM EPITAXY
Design and study of photon-assisted heteroepitaxial growth system
[LAAS-91187] N92-12753
MOLECULAR BEAMS
Studies of complex fragment emission in heavy ion reactions
[DE92-000532] N92-12653
MOLECULAR BIOLOGY
Beta-lactamase genes of Streptomyces badius, Streptomyces cacaoi and Streptomyces fradiae: Cloning and expression in Strepotomyces lividans N92-12394
Molecular analysis of beta-lactamases from four species of Streptomyces: Comparison of amino acid sequences with those of other beta-lactamases N92-12395
MOLECULAR CHAINS
Diffraction by macromolecular fluids
[DE91-016219] N92-12089
Local states in one-dimensional CDW (Charge Density Wave) materials: Spectral signatures for polarons and bipolarons in MX chains
[DE90-013150] N92-12605
MOLECULAR CLOUDS
A three-dimensional model for molecular cloud collapse and protostellar formation N92-12898
Interstellar organics and possible connections with the carbonaceous components of meteorites and IDPs N92-12902
Methanol in the sky with diamonds N92-12903

Physical conditions and heating/cooling processes in high mass star formation regions
[MPE-PREPRINT-200] N92-12974

MOLECULAR COLLISIONS
Diffraction by macromolecular fluids
[DE91-016219] N92-12089

MOLECULAR DIFFUSION
Quantum Monte Carlo for atoms and molecules
[DE90-013793] N92-12608

MOLECULAR INTERACTIONS
Excess mixing volumes and specific interactions in organic molecule mixing
[ETN-91-90171] N92-12616

MOLECULAR SPECTRA
A continued program of planetary study at the University of Texas McDonald Observatory N92-12852
Spectroscopy of comets N92-12856
Io's atmosphere detected by ground-based microwave spectroscopy N92-12859

MOLECULAR STRUCTURE
Diffraction by macromolecular fluids
[DE91-016219] N92-12089
Recognition of three dimensional shapes: Application to chemical molecules
[TELECOM-PARIS-90-E-018] N92-12613
Novel approaches to the calculation of the electronic structure and dynamics of excited states: Application to trans-di-imide and ethylene
[ETN-91-90309] N92-12628
CEPA-type size consistency corrections for MRSDCI calculations, MRCEPA N92-12631

MOLECULES
Probe molecule studies: Active species in alcohol synthesis
[DE92-000332] N92-12138
Properties of liquid water and carbon dioxide from constant pressure-constant temperature molecular dynamics
[DE91-018219] N92-12633
P-d capture reactions in muonic molecules
[DE92-000256] N92-12645

MOLTEN SALTS
Molten carbonate fuel cell research
[DE90-013896] N92-12120

MOLYBDENUM SULFIDES
Reduced molybdenum oxidation states in hydrodesulfurization catalysis by Chevrel phases
[DE91-018168] N92-12092

MOMENTUM TRANSFER
Neutron Brillouin scattering in a metallic glass
[DE92-000219] N92-12642

MONATOMIC GASES
Few-body collisions in a weakly interacting Bose gas
[ETN-91-90307] N92-12621
Spin-exchange and dipole relaxation rates in atomic hydrogen: Rigorous and simplified calculations N92-12622
Resonances in recombination of atomic hydrogen due to long-range H3 molecular states N92-12627

MONITORS
Precise relative sea surface positioning of a floating platform using the Global Positioning System (GPS) N92-11987
Automation for deep space vehicle monitoring N92-12022
A Linear Variable Differential Transfer (LVDT) conditioner for the bundle profile monitor of AmPS
[DIGEL-1991-1] N92-12178
Single-column ion chromatography of passive monitors for atmospheric pollution
[NRC-28893] N92-12352
The effect of on/off indicator design on state confusion, preference, and response time performance, executive summary
[NASA-CR-185662] N92-12416

MONOMERS
Influences of expanding monomer on carbon fiber reinforced epoxy composites 2
[AD-A240583] N92-12057

MONTE CARLO METHOD
Compression ramp in rarefied gas
[RC-90-08] N92-11978
Flat planes in rarefied hypersonic flows
[SESSIA-430/91-940] N92-11979
Application of parallel computing to the Monte Carlo simulation of electron scattering in solids: A rapid method for profile deconvolution
[DE90-009322] N92-12072
Solving stochastic linear programs on a hypercube multicomputer
[AD-A240630] N92-12472
A Monte Carlo study of the light (q sup 2)(bar q sup 2) system
[DE92-000449] N92-12580
Quantum Monte Carlo for atoms and molecules
[DE90-013793] N92-12608
Monte Carlo approaches to effective field theories
[DE92-000198] N92-12771

MOON
Arecibo S-band radar program N92-12803
Planetary astronomy N92-12844
Sodium and potassium in the lunar atmosphere N92-12884

MORPHOLOGY
Physicochemical investigation of the compatibilization of polyolefin/polyamide blends: Morphology, thermal analysis, and specific interactions
[NRC-29455] N92-12124
Processing-morphology relationships of compatibilized polyolefin/polyamide blends. Part 1: The effect of an ionomer compatibilizer on blend morphology
[NRC-29094-PT-1] N92-12127
Mathematical morphology and active contour model: A cooperative approach of lung contours in CT
[TELECOM-PARIS-91-C-004] N92-12405
Morphological discretization
[CWI-BS-R9105] N92-12479
On the construction of translation and rotation invariant morphological operators
[CWI-AM-R9025] N92-12486
Cometary spectroscopy and imaging N92-12827

MOTION PERCEPTION
Direct estimation of deformable motion parameters from a range image sequence
[NRC-31757] N92-12476

MOTION PICTURES
Perceived sharpness in static and moving images
[ETN-91-90138] N92-12413

MOTOR VEHICLES
Monitoring IACP samples and construction of a centralized database
[PB91-213546] N92-12351
Forecast of transportation energy demand through the year 2010
[DE92-000222] N92-12788

MRCA AIRCRAFT
Expert system for the Tornado ground-based check-out system N92-12536

MULTIGRID METHODS
A two-grid analysis of the combination of mixed finite elements and Vanka-type relaxation
[CWI-NM-R9102] N92-12566
Efficient multi-dimensional upwinding for the steady Euler equations
[CWI-NM-R9107] N92-12570

MULTIPHASE FLOW
Periodically structured multiphase flows and hydrodynamic instabilities in narrow capillaries
[DE91-018802] N92-12223

MULTIPLEXING
Optimal realization of multistage cascade circuits
[ETN-91-90165] N92-12182
A novel scanning interferometer for two-dimensional plasma density measurements
[DE90-625514] N92-12697

MULTIPROCESSING (COMPUTERS)
A research program in finite element analysis and iterative solution on advanced processors
[DE90-013958] N92-12446
The data oriented requirements implementation scheme N92-12460
Solving stochastic linear programs on a hypercube multicomputer
[AD-A240630] N92-12472

MULTISENSOR APPLICATIONS
Reasoning with uncertain and incomplete information in aerospace applications N92-12544

MULTIVARIATE STATISTICAL ANALYSIS
Objective method for assessing monitoring networks
[DE90-505577] N92-12346

MUONS
P-d capture reactions in muonic molecules
[DE92-000256] N92-12645
Jet rates from deep inelastic muon scattering in the W range of 15 to 35 GeV
[DE92-000470] N92-12651

MURCHISON METEORITE
Modification of amino acids at shock pressures of 3 to 30 GPA: Initial results N92-12926

MUTAGENS
Monitoring IACP samples and construction of a centralized database
[PB91-213546] N92-12351

MUTATIONS
Transcriptional induction of Streptomyces cacaoi beta-lactamase by a beta-lactam compound N92-12396
Mutagenic analysis of the S. fradiae beta-lactamase promoter N92-12397

N

NAKHLITES
Nd-142/Nd-144 in SNCs and early differentiation of a heterogeneous Martian mantle N92-12925

NASA PROGRAMS
Future applications of artificial intelligence to Mission Control Centers N92-12032
Life sciences report 1987
[NASA-TM-105105] N92-12388
A continued program of planetary study at the University of Texas McDonald Observatory N92-12852

NASA SPACE PROGRAMS
JPL's Space Flight Operations Center: Development project overview N92-12012

NATURAL SATELLITES
Volatiles in the outer solar system N92-12807
Studies of relationships among outer solar system small bodies and related objects N92-12818
Research in planetary Astronomy N92-12831

NAVIER-STOKES EQUATION
Compression ramp in rarefied gas
[RC-90-08] N92-11978
Flat planes in rarefied hypersonic flows
[SESSIA-430/91-940] N92-11979
An assessment and application of turbulence models for hypersonic flows
[NASA-TM-105124] N92-11984
Numerical solution of incompressible Navier-Stokes equations using a velocity-vorticity formulation N92-12205
Time stepping procedures for the nonstationary Stokes equations
[PREPRINT-1353] N92-12217
Time delay and finite differences for the nonstationary nonlinear Navier-Stokes equations
[PREPRINT-1359] N92-12218

NAVIGATION AIDS
Adaptive tactical navigation program N92-12529
Integrated Communications, Navigation, Identification, Avionics (ICNIA) expert system for fault tolerant avionics N92-12539

NAVIGATION INSTRUMENTS
Engineering Graphical Analysis Tool (EGAT) development program N92-12542

NAVIGATION SATELLITES
Precise relative sea surface positioning of a floating platform using the Global Positioning System (GPS) N92-11987

NEAR INFRARED RADIATION
Structural and optical characterisation of Langmuir-Blodgett films for data storage applications N92-12780
Spectroscopic planetary detection N92-12808
Operation of the University of Hawaii 2.2M telescope on Mauna Kea N92-12814
Research in planetary Astronomy N92-12831
Stellar occultations by planetary rings: 3 July 1989 28 SGR occultation by Saturn N92-12838
Visual and near-IR spectrophotometry of asteroids N92-12878
Near infrared imaging of the outer planets N92-12880

NEAR ULTRAVIOLET RADIATION
Physical observations of comets: Their composition, origin and evolution N92-12864

NEBULAE
A guide to the use of theoretical models of the solar nebula for the interpretation of the meteoritic record N92-12912

NEGATIVE IONS
Laboratory simulation of the surface of Halley's Comet N92-12872

NEODYMIUM ISOTOPES
Nd-142/Nd-144 in SNCs and early differentiation of a heterogeneous Martian mantle N92-12925

NEODYMIUM LASERS
Development of high spectral resolution lidar technology
[DE92-000080] N92-12686
Flashlamp pumping of Nd:glass disk amplifiers
[DE90-013482] N92-12703
The multipulse Thomson scattering diagnostic on the D3-D tokamak
[DE92-000262] N92-12732

NEON
Fractionation of terrestrial neon by hydrodynamic hydrogen escape from ancient steam atmospheres N92-12931

NEPTUNE SATELLITES
Near infrared imaging of the outer planets N92-12880

NETHERLANDS
Storm calendar 1964-1990: Chronological survey of all storms (wind force 8 and higher) along the Dutch coast in the period 1964-1990
[KNMI-176] N92-12374
NETWORK ANALYSIS
Three dimensional reconstruction of vascular networks in trinocular vision
[TELECOM-PARIS-90-E-022] N92-12406
Performance analysis of LAN bridges and routers N92-12501
MTX (Microwave Tokamak Experiment) data acquisition and analysis computer network
[DE90-013066] N92-12694
NETWORK CONTROL
Using NetMaster to manage IBM networks N92-12500
NEURAL NETS
Some simple bounds for approximations of sigmoidal functions in layered neural nets
[REPT-90-022] N92-12511
The radon transform for data reduction, line detection, and artificial neural network preprocessing
[DE90-013521] N92-12516
Automated threat response recommendation in environments of high data uncertainty using the Countermeasure Association Technique (CMAT) N92-12525
Future ESM systems and the potential for neural processing N92-12526
Neural network solutions to mathematical models of parallel search for optimal trajectory generation N92-12527
Locally linear neural networks for aerospace navigation systems N92-12530
Tracking and vertex finding with drift chambers and neural networks
[DE92-000472] N92-12652
NEUTRAL ATMOSPHERES
Galileo-related ground-based observations of the Jovian System N92-12798
NEUTRAL ATOMS
Trapping of neutral atoms with resonant microwave radiation N92-12623
NEUTRINOS
Direct measurements of neutrino mass
[DE92-000168] N92-12638
Radio telescopes as the detectors of super-high-energy neutrinos N92-12945
NEUTRON ACTIVATION ANALYSIS
Microprobe studies of microtomed particles of white druse salts in shergottite EETA 79001 N92-12921
NEUTRON COUNTERS
A high-efficiency neutron coincidence counter for small samples
[DE92-000183] N92-12639
NEUTRON DIFFRACTION
Strengthening of composites by internal stresses: Determination by neutron diffraction
[DE91-018549] N92-12756
NEUTRON FLUX DENSITY
Neutron flux enhancement at LASREF
[DE92-000196] N92-12640
NEUTRON RADIOGRAPHY
Neutron interactions and contrast production in neutron radiography
[DE91-019064] N92-12294
NEUTRON SCATTERING
Neutron interactions and contrast production in neutron radiography
[DE91-019064] N92-12294
Neutron Brillouin scattering in a metallic glass
[DE92-000219] N92-12642
NEUTRON SOURCES
Neutron interactions and contrast production in neutron radiography
[DE91-019064] N92-12294
Detection system characteristics using Cf-252 ionization chambers
[DE90-011702] N92-12610
Neutron flux enhancement at LASREF
[DE92-000196] N92-12640
NEUTRON STARS
Nonthermal synchrotron pair cascades in strong magnetic fields: A gamma ray burst emission model N92-12899
Neutron starquake model for gamma-ray bursts N92-12938
Generation of ultrahigh-energy gamma rays in accreting x ray pulsars N92-12950
On the nature of pulsar radiation N92-12956
On the observational appearances of a freely precessing neutron star in Hercules X-1 N92-12963
NEUTRONS
A high-efficiency neutron coincidence counter for small samples
[DE92-000183] N92-12639
Neutron flux enhancement at LASREF
[DE92-000196] N92-12640
Neutron Brillouin scattering in a metallic glass
[DE92-000219] N92-12642
Cosmogenic Ar-36 from neutron capture by Cl-35 in the Chico L6 chondrite: Additional evidence for large shielding N92-12914
NEWTON METHODS
Motivating quasi-Newton updates by preconditioned conjugate gradient methods
[MATHS-REPT-A-150] N92-12577
NICKEL
The interaction of SiC with Fe, Ni, and their alloys
[ETN-91-90137] N92-12103
NICKEL ALLOYS
Creep in L1(2)-intermetallics
[DE91-018231] N92-12112
Electroless vs electrodeposited Ni-P alloys for diamond turning applications
[DE91-018999] N92-12113
The effect of casting temperature on the fatigue properties of cast nickel aluminide alloys
[DE92-000432] N92-12118
NICKEL CADMIUM BATTERIES
Performance evaluation of advanced battery technologies for electric vehicle applications
[DE90-013895] N92-12171
NIOBIUM ALLOYS
Nuclear power engineering in space
[DE90-012743] N92-12656
NITRAMINE PROPELLANTS
The 27th JANNAF Combustion Subcommittee Meeting, Volume 1
[CPIA-PUBL-557-VOL-1] N92-12048
NITRIC ACID
Transformation and deposition of atmospheric nitrogen species: A view from the aqueous side
[DE90-013737] N92-12348
NITROGEN
The calculation of theoretical coherent anti-Stokes Raman spectra
[NRC-29810] N92-12085
NITROGEN DIOXIDE
Nitrogen dioxide fluorescence following photolysis in a supersonic jet
[DE90-014164] N92-12078
NITROGEN OXIDES
Transformation and deposition of atmospheric nitrogen species: A view from the aqueous side
[DE90-013737] N92-12348
NITROGENATION
Control of catalytic hydrotreating selectivity with ammonia
[DE91-018084] N92-12091
NITROUS OXIDES
Thermophysical properties of nitrous oxide
[ESDU-91022] N92-12082
Climate Monitoring and Diagnostics Laboratory no. 18
[PB91-205559] N92-12371
NOISE MEASUREMENT
Vacuum-isolation vessel and method for measurement of thermal noise in microphones
[NASA-CASE-LAR-14567-1-CU] N92-12174
NOISE PREDICTION (AIRCRAFT)
Helicopter main-rotor speed effects: A comparison of predicted ranges of detection from the aural detection program ICHIN and the electronic detection program ARCAS
[NASA-TM-104134] N92-12598
NOISE REDUCTION
Helicopter main-rotor speed effects: A comparison of predicted ranges of detection from the aural detection program ICHIN and the electronic detection program ARCAS
[NASA-TM-104134] N92-12598
NOISE THRESHOLD
Helicopter main-rotor speed effects: A comparison of predicted ranges of detection from the aural detection program ICHIN and the electronic detection program ARCAS
[NASA-TM-104134] N92-12598
NONDESTRUCTIVE TESTS
Structures and fracture mechanic of brittle matrix composites
[REPT-911-430-131] N92-12064
Nondestructive testing of oxidation protected carbon/carbon materials
[REPT-911-430-136] N92-12065
Nondestructive testing of sandwich structures
[REPT-911-430-137] N92-12066
Acoustic emission applied to composite material structures
[REPT-911-430-138] N92-12067
Design of an industrial CT system for very large composite structures
[REPT-911-430-133] N92-12145
Wave propagation and scattering in layered media: Application to ultrasonic nondestructive evaluation of interfacial cracks and earthquake ground motion N92-12285
Inspection of materials and structures by infrared thermography: Signal processing techniques for defect enhancement and characterization
[NRC-29717] N92-12291
NONLINEAR EQUATIONS
Time delay and finite differences for the nonstationary nonlinear Navier-Stokes equations
[PREPRINT-1359] N92-12218
A general nonlinear theory of large elastic deformation of layered plates N92-12296
Some simple bounds for approximations of sigmoidal functions in layered neural nets
[REPT-90-022] N92-12511
Algebraic calculation of stroboscopic maps of ordinary, nonlinear differential equations
[DE92-000220] N92-12578
NONLINEAR SYSTEMS
Calculated non-linear magnetic field penetration of plasma opening switches
[DE90-013156] N92-12166
Ocean/bottom acoustic interaction with arbitrary bottom profile
[FFI-91/7009] N92-12386
Algebraic calculation of stroboscopic maps of ordinary, nonlinear differential equations
[DE92-000220] N92-12578
Nonlinear dynamics of optical ring resonators
[ETN-91-90173] N92-12680
NONPARAMETRIC STATISTICS
Two nonparametric estimators of the survival function of bivariate right censored observations
[CWI-BS-R9035] N92-12583
NOVA LASER SYSTEM
Large area laser conditioning of dielectric thin film mirrors
[DE90-013485] N92-12674
NUCLEAR CAPTURE
P-d capture reactions in muonic molecules
[DE92-000256] N92-12645
NUCLEAR DEFORMATION
Superdeformed nuclei
[DE92-000269] N92-12647
Investigations of nuclear structure and nuclear reactions induced by complex projectiles
[DE92-000533] N92-12654
NUCLEAR ELECTRIC POWER GENERATION
A plan for the study of the costs and environmental impact of fusion compared with alternative energy sources
[DE90-013068] N92-12696
NUCLEAR EXPLOSIONS
Studies of complex fragment emission in heavy ion reactions
[DE92-000532] N92-12653
NUCLEAR FISSION
Detection system characteristics using Cf-252 ionization chambers
[DE90-011702] N92-12610
Kinematic measurement of alpha particles accompanied by spontaneous fission of Cf-252
[ETN-91-90175] N92-12618
NUCLEAR FUELS
Nuclear power engineering in space
[DE90-012743] N92-12656
Tritium proof-of-principle pellet injector
[DE92-000390] N92-12734
NUCLEAR FUSION
A plan for the study of the costs and environmental impact of fusion compared with alternative energy sources
[DE90-013068] N92-12696
Reflectometry and transport in thermonuclear plasmas in the joint European Torus
[ETN-91-90135] N92-12709
Nucleosynthetic gamma ray lines and positrons from supernovae N92-12983
NUCLEAR INTERACTIONS
Experimental results from studies on nucleus-nucleus collisions at high energy
[DE90-012286] N92-12658
NUCLEAR MEDICINE
Nuclear Medicine Program
[DE92-000383] N92-12411
NUCLEAR PHYSICS
Theoretical nuclear physics
[DE92-000022] N92-12615

Monte Carlo approaches to effective field theories
[DE92-000198] N92-12771
The GAMMASPHERE
[DE92-000448] N92-12986

NUCLEAR POWER PLANTS
Heat transfer between stratified liquids with bubbling across the interface
[DE90-008579] N92-12192
COMMIX-1AR/P: A three-dimensional transient single-phase computer program for thermal hydraulic analysis of single and multicomponent systems
[DE91-018703] N92-12222
Magnetohydrodynamic projects at the CDIF
[DE92-000396] N92-12735

NUCLEAR REACTIONS
Studies of complex fragment emission in heavy ion reactions
[DE92-000532] N92-12653
Investigations of nuclear structure and nuclear reactions induced by complex projectiles
[DE92-000533] N92-12654

NUCLEAR REACTORS
Neutron interactions and contrast production in neutron radiography
[DE91-019064] N92-12294
Nuclear power engineering in space
[DE90-012743] N92-12656
Electromagnetic loads on ITER in-vessel components
[DE92-000672] N92-12739

NUCLEAR SCATTERING
Measurement of rho, the ratio of the real to imaginary part of the (-p)p forward elastic scattering amplitude, at (radical)s = 1.8 TeV
[DE92-000155] N92-12637
P-d capture reactions in muonic molecules
[DE92-000256] N92-12645

NUCLEAR SPIN
Analysis and interpretation of CCD data on P/Halley and physical parameters and activity status of cometary nuclei at large heliocentric distance N92-12797

NUCLEAR STRUCTURE
Nuclear structure theory
[DE90-013949] N92-12609
Superdeformed nuclei
[DE92-000269] N92-12647
Investigations of nuclear structure and nuclear reactions induced by complex projectiles
[DE92-000533] N92-12654

NUCLEATE BOILING
Boiling inside tubes: Saturated wet-wall heat transfer with mixtures
[ESDU-91011] N92-12208

NUCLEATION
Prospects in extended inflation N92-12900

NUCLEI (NUCLEAR PHYSICS)
Superdeformed nuclei
[DE92-000269] N92-12647
Investigations of nuclear structure and nuclear reactions induced by complex projectiles
[DE92-000533] N92-12654

NUCLEONS
Studies of complex fragment emission in heavy ion reactions
[DE92-000532] N92-12653

NUMERICAL ANALYSIS
On the feasibility of numerical analysis of large creep problems N92-12298
An algorithm for determining EF coils from fixed-boundary equilibria applied to ARIES 3
[DE92-000170] N92-12730

NUMERICAL STABILITY
Smoothed Runge-Kutta methods in the method of lines
[CWI-NM-R9101] N92-12565
Parallel solution of the Burgers equation
[CWI-NM-R9104] N92-12568

NUMERICAL WEATHER FORECASTING
Development of atmospheric diffusion evaluation method incorporating thermal and topographical effects. Part 2: A literature review of turbulence model under topographical condition
[DE90-503795] N92-12345

NUTATION
The spin down of the radio pulsars: Braking index N92-12936

NYLON (TRADEMARK)
Processing-morphology relationships of compatibilized polyolefin/polyamide blends. Part 1: The effect of an ionomer compatibilizer on blend morphology
[NRC-29094-PT-1] N92-12127

O

OBJECT PROGRAMS
Integration of applicative and object oriented programming
[ETN-91-90168] N92-12478

OBJECT-ORIENTED PROGRAMMING
A survey of available tools and methods for software requirements capture and design N92-12450
A practical experience of Ada for developing embedded software N92-12465

OBSERVATORIES
Allegheny Observatory search for planetary systems N92-12812
A continued program of planetary study at the University of Texas McDonald Observatory N92-12852

OCCULTATION
Photometry of Pluto-Charon mutual events and Hirayama family asteroids N92-12799
Studies of extended planetary atmospheres N92-12822
Occultation studies of the solar system N92-12834
Studies of Triton and the Pluto-Charon system N92-12850

OCEAN BOTTOM
Ocean/bottom acoustic interaction with arbitrary bottom profile
[FFI-91/7009] N92-12386

OCEAN CURRENTS
Ocean energy contract list, fiscal year 1990
[DE91-002177] N92-12333
Autonomous ocean profiler
[AD-A239800] N92-12383
A Pacific Ocean general circulation model for satellite data assimilation
[NASA-CR-189447] N92-12384

OCEAN DATA ACQUISITIONS SYSTEMS
Autonomous ocean profiler
[AD-A239800] N92-12383

OCEAN MODELS
A Pacific Ocean general circulation model for satellite data assimilation
[NASA-CR-189447] N92-12384

OCEAN SURFACE
Precise relative sea surface positioning of a floating platform using the Global Positioning System (GPS) N92-11987
An atlas of monthly mean distributions of GEOSAT sea surface height, SSMI surface wind speed, AVHRR/2 sea surface temperature, and ECMWF surface wind components during 1988
[NASA-CR-189029] N92-12385

OCEAN THERMAL ENERGY CONVERSION
Ocean energy contract list, fiscal year 1990
[DE91-002177] N92-12333
Production of desalinated water using ocean thermal energy
[DE91-018894] N92-12336

OCEANOGRAPHIC PARAMETERS
Autonomous ocean profiler
[AD-A239800] N92-12383

OCEANOGRAPHY
Precise relative sea surface positioning of a floating platform using the Global Positioning System (GPS) N92-11987
Concluding remarks: Promises and limitations of individual cell and particle analysis
[DE91-016900] N92-12381
A Pacific Ocean general circulation model for satellite data assimilation
[NASA-CR-189447] N92-12384
Contents of the JPL Distributed Active Archive Center (DAAC) archive, version 2-91
[NASA-CR-189027] N92-12784

OCEANS
Contents of the JPL Distributed Active Archive Center (DAAC) archive, version 2-91
[NASA-CR-189027] N92-12784

OCULOMETERS
Lessons learned in control center technologies and non-technologies N92-12026

OFFSHORE ENERGY SOURCES
Outer continental shelf environmental assessment program. Volume 73: Final Reports of principal investigators
[PB91-204917] N92-12382

OILS
Periodically structured multiphase flows and hydrodynamic instabilities in narrow capillaries
[DE91-018802] N92-12223

OLIGOMERS
Excess mixing volumes and specific interactions in organic molecule mixing
[ETN-91-90171] N92-12616

OLIVINE
Olivines in angrite LEW 87051: Phenos or xenos N92-12924

ON-LINE SYSTEMS
A fast online event display for a high intensity fixed-target spectrometer
[DE90-012047] N92-12443

OPERATING SYSTEMS (COMPUTERS)
Formal specification of satellite telemetry: A practical experience N92-12456
An assessment of the ModSim/TWOS parallel simulation environment
[DE91-011400] N92-12512
NFS(tm), Kerberos(tm), and UNICOS(r)
[DE92-000246] N92-12514

OPERATIONS RESEARCH
Columbus Free Flyer Center: Tasks and manpower profiles
[MBB-UO-0154-91-PUB] N92-12588
Solar array management guide
[REPT-911-440-114] N92-12778

OPERATORS (MATHEMATICS)
On the construction of translation and rotation invariant morphological operators
[CWI-AM-R9025] N92-12486
Process algebra with signals and conditions
[CWI-CS-R9103] N92-12510
A process for the calculation by approximation of the Preisach operator with usual differential equation applications
[ETN-91-90157] N92-12561
A two-grid analysis of the combination of mixed finite elements and Vanka-type relaxation
[CWI-NM-R9102] N92-12566
Parallel solution of the Burgers equation
[CWI-NM-R9104] N92-12568

OPHIUCHI CLOUDS
Infrared studies of star formation in the rho Ophiuchi dark cloud N92-12790

OPTICAL COMMUNICATION
Coherent communication link using diode-pumped lasers
[NASA-CR-189248] N92-12149

OPTICAL DATA PROCESSING
Mission critical technology development N92-12031

OPTICAL DATA STORAGE MATERIALS
Structural and optical characterisation of Langmuir-Blodgett films for data storage applications N92-12780

OPTICAL EQUIPMENT
Unattended optical surveillance equipment
[DE90-013403] N92-12228

OPTICAL FIBERS
Stimulated Raman scattering in optical fibers: Polychromatic single-field numerical experiments
[DE90-012894] N92-12671
Analysis of cladded uniaxial single crystal fibers
[NRC-32596] N92-12678

OPTICAL FILTERS
Design and testing of 3-level optimal correlation filters
[DE91-019059] N92-12685

OPTICAL MATERIALS
Laser conditioning of optical thin films
[DE90-013483] N92-12672
Effects of oxide layers on optical properties and x ray hardness of Al-Be mirrors
[DE92-000476] N92-12687

OPTICAL MEASURING INSTRUMENTS
Design and testing of 3-level optimal correlation filters
[DE91-019059] N92-12685

OPTICAL MEMORY (DATA STORAGE)
Structural and optical characterisation of Langmuir-Blodgett films for data storage applications N92-12780

OPTICAL PROPERTIES
The far infrared optical constants of some common polymers
[NPL-DES-111] N92-12682
Effects of oxide layers on optical properties and x ray hardness of Al-Be mirrors
[DE92-000476] N92-12687
Optical properties of MX chain materials: An extended Peierls-Hubbard model
[DE92-000314] N92-12764
Simultaneous determination of optical and thermodynamic properties of an evaporating aqueous solution droplet
[DE90-010652] N92-12767
Structural and optical characterisation of Langmuir-Blodgett films for data storage applications N92-12780

OPTICAL PUMPING
The laser system of the optically pumped ion source at TRIUMF
[DE90-013102] N92-12248

An astigmatic unstable resonator with an intracavity deformable mirror
[DE91-018815] N92-12257
Flashlamp pumping of Nd:glass disk amplifiers
[DE90-013482] N92-12703

OPTICAL RADAR
Development of high spectral resolution lidar technology
[DE92-000080] N92-12686

OPTICAL RESONATORS
The characters of slab lasers
[DE90-625397] N92-12246
Nonlinear dynamics of optical ring resonators
[ETN-91-90173] N92-12680

OPTICAL THICKNESS
Anomalous dispersion in gases derived from the optical depth. Theoretical treatment: Line by line calculations
[NDRE/PUBL-91/1002] N92-12675

OPTIMAL CONTROL
Optimal control of large space structures using distributed gyricity: A continuum approach
[UTIAS-341] N92-12042
Optimal stochastic control of multirate sampled-data systems
[REPT-90-019] N92-12586

OPTIMIZATION
On simple aerodynamic sensitivity derivatives for use in interdisciplinary optimization
[NASA-TM-104145] N92-11985
Improved specimen support jig for hot-wet compression testing
[NRC-LTR-ST-1790] N92-12059
A synthesis process for the optimization of the radiation properties of microstrip antennas
[ETN-91-90155] N92-12155
Optimality conditions for minimax tasks: An application example from communications engineering
[ETN-91-90169] N92-12156
Optimal realization of multistage cascade circuits
[ETN-91-90165] N92-12162
Potential of tuneable lasers for optimised dual-colour laser ranging
[REPT-911-440-111] N92-12255
Toward the optimisation of passive ground targets in spaceborne laser ranging
[REPT-911-440-112] N92-12256
Optimal design of nonlinear shell structures
[FFA-TN-1991-18] N92-12312
On a generalized Polak-Ribiere algorithm for unconstrained minimization
[MATHS-REPT-A-148] N92-12491
Vectorization and parallelization of the AEROLOG3D code in collaboration with Matra
[ONERA-RF-37/3479-CY] N92-12508
Heuristic route optimization: A model for force level route planning N92-12520
Convexly constrained ill posed problems and their regularization, using iterative processes
[ETN-91-90156] N92-12560
Semi-stochastic approximation by the Response Surface Methodology (RSM)
[ETN-91-90210] N92-12581
Optimization on AmPS chicane magnets
[NIKHEF-K-AMPS/91-02] N92-12595

ORBIT CALCULATION
MacSPOC: Orbital trajectory calculations on a laptop computer N92-12027
Comet and asteroid dynamics N92-12857
The 1990 MB: The first Mars Trojan N92-12861
The companion object to HD114762 N92-12865

ORBITAL SERVICING
Launch site operations for Columbus Free Flyer and resupply mission
[MBB-UO-0153-91-PUB] N92-12034

ORBITS
Finite orbit energetic particle linear response to toroidal Alfven Eigenmodes
[DE91-018418] N92-12612
The year 1990 marks end of Pluto-Charon mutual event season N92-12889

ORGANIC COMPOUNDS
Molecular to material design for anomalous-dispersion phase-matched second harmonic generation
[DE91-017999] N92-12683
Phase diagram of anisotropic two-dimensional quarter-filled band of interacting electrons
[DE90-013171] N92-12748
Interstellar organics and possible connections with the carbonaceous components of meteorites and IDPs N92-12902

ORGANIC MATERIALS
Excess mixing volumes and specific interactions in organic molecule mixing
[ETN-91-90171] N92-12616

ORGANIZATIONS
Control mechanisms in Italian business groups
[REPT-90-014] N92-12775
The organization of an options market: Case of the European options market
[REPT-90-016] N92-12777

ORGANIZING
Modular organization of domestic care in Weert (Netherlands)
[ISBN-90-6757-045-1] N92-12772

ORGANOMETALLIC POLYMERS
A process for preparing an assembly of an article and a soluble polyimide which resists dimensional change, delamination, and debonding when exposed to changes in temperature
[NASA-CASE-LAR-14763-1] N92-12121

ORTHOTROPIC PLATES
Identification of complex modules in othotropic materials by means of free vibration analysis
[REPT-911-550-101] N92-12311

OSCILLATING FLOW
Fluid oscillations and enhanced heat transfer in a parallel plate channel bounded by end reservoirs maintained at different temperature N92-12202

OSCILLATIONS
First order tune shift calculations for transverse betatron dynamics
[DE92-000370] N92-12668

OSCILLATORS
Coherent communication link using diode-pumped lasers
[NASA-CR-189248] N92-12149

OUTGASSING
Minor planet 1566 Icarus: Asteroid or comet? N92-12895

OXIDATION
Atomic oxygen interaction with spacecraft materials: Relationship between orbital and ground-based testing for materials certification
[NASA-TM-105449] N92-12046
High-temperature corrosion of Nicalon(tm)/SiC composites
[DE92-000281] N92-12071
Development of surface treatments and alloy modifications for corrosion-resistant oxide scales
[DE90-012723] N92-12097
Transformation and deposition of atmospheric nitrogen species: A view from the aqueous side
[DE90-013737] N92-12348
Aqueous alteration on the parent bodies of carbonaceous chondrites: Computer simulations of late-stage oxidation N92-12908

OXIDATION RESISTANCE
Nondestructive testing of oxidation protected carbon/carbon materials
[REPT-911-430-136] N92-12065

OXIDE FILMS
Laser conditioning of optical thin films
[DE90-013483] N92-12672
Effects of oxide layers on optical properties and x ray hardness of Al-Be mirrors
[DE92-000476] N92-12687

OXIDES
Controlled microstructure oxide coating for chemical sensors
[DE90-012223] N92-12119

OXYGEN
Analysis of minerals containing dissolved traces of the fluid phase components water and carbon dioxide
[NASA-CR-188993] N92-12083

OXYGEN ATOMS
Atomic oxygen interaction with spacecraft materials: Relationship between orbital and ground-based testing for materials certification
[NASA-TM-105449] N92-12046

OXYGEN ISOTOPES
Theoretical nuclear physics
[DE92-000022] N92-12615
Carbon and oxygen isotope composition of carbonates from an L6 chondrite: Evidence for terrestrial weathering from the Holbrook meteorite N92-12928

OXYGEN MASKS
Evaluation of the physiological effects of an additional dead space involved in wearing an anti-smoke mask
[REPT-9/CEV/SE/LAMAS] N92-12420

OXYGEN PRODUCTION
Method for producing oxygen from lunar materials
[NASA-CASE-MSC-21759-1] N92-12079

OXYGEN 17
Extraterrestrial water of possible Martian origin in SNC meteorites: Constraints from oxygen isotopes N92-12917

OXYGEN 18
Extraterrestrial water of possible Martian origin in SNC meteorites: Constraints from oxygen isotopes N92-12917

OXYGENATION
Superconducting La2CuO(4+x) prepared by oxygenation at high pressure: A Raman scattering study
[DE90-012915] N92-12747

OZONE
Transformation and deposition of atmospheric nitrogen species: A view from the aqueous side
[DE90-013737] N92-12348
Managing global climate change through international cooperation: Lessons from prior resource management efforts
[DE90-014699] N92-12350
Workshop on Artificially Ionized Layers in the Atmosphere
[DE90-013470] N92-12358
Climate Monitoring and Diagnostics Laboratory no. 18
[PB91-205559] N92-12371
Ground based infrared measurements of the global distribution of ozone in the atmosphere of Mars N92-12875

OZONOMETRY
Ground based infrared measurements of the global distribution of ozone in the atmosphere of Mars N92-12875

P

PACIFIC OCEAN
A Pacific Ocean general circulation model for satellite data assimilation
[NASA-CR-189447] N92-12384

PAIR PRODUCTION
Search for new particles in CDF
[DE92-000638] N92-12655
Nonthermal synchrotron pair cascades in strong magnetic fields: A gamma ray burst emission model N92-12899

PALLADIUM COMPOUNDS
Hydrogen isotopic exchange over palladium metal
[DE90-012063] N92-12076

PARABOLIC REFLECTORS
Trends in dish-Stirling solar receiver designs
[DE90-011507] N92-12324

PARALLEL COMPUTERS
Synchronization of parallel processes by hardware: Realizations in asynchronous technique
[ETN-91-90164] N92-12509
Parallel diagonally implicit Runge-Kutta-Nystroem methods
[CWI-NM-R9103] N92-12567

PARALLEL PLATES
Fluid oscillations and enhanced heat transfer in a parallel plate channel bounded by end reservoirs maintained at different temperature N92-12202

PARALLEL PROCESSING (COMPUTERS)
Application of parallel computing to the Monte Carlo simulation of electron scattering in solids: A rapid method for profile deconvolution
[DE90-009322] N92-12072
A standard test set for numerical approximations to the shallow water equations in spherical geometry
[DE92-000385] N92-12365
A highly parallel multigrid-like method for the solution of the Euler equations
[NASA-CR-188816] N92-12496
Vectorization and parallelization of the AEROLOG3D code in collaboration with Matra
[ONERA-RF-37/3479-CY] N92-12508
Synchronization of parallel processes by hardware: Realizations in asynchronous technique
[ETN-91-90164] N92-12509
An assessment of the ModSim/TWOS parallel simulation environment
[DE91-011400] N92-12512
Future ESM systems and the potential for neural processing N92-12526
On finding minimum-diameter clique trees
[DE92-000386] N92-12579
Magnetohydrodynamic cellular automata
[NIFS-16] N92-12707

PARALLEL PROGRAMMING
Constraint treatment techniques and parallel algorithms for multibody dynamic analysis N92-12297
On finding minimum-diameter clique trees
[DE92-000386] N92-12579

PARAMETER IDENTIFICATION
A virtual sensor approach to robot kinematic identification: Theory and experimental implementation
[DE90-012186] N92-12267
Observation model and parameter partials for the JPL VLBI parameter estimation software MODEST/1991
[NASA-CR-189035] N92-12481

PARTIAL DIFFERENTIAL EQUATIONS
A research program in finite element analysis and iterative solution on advanced processors
[DE90-013958] N92-12446
Smoothed Runge-Kutta methods in the method of lines
[CWI-NM-R9101] N92-12565
Parallel solution of the Burgers equation
[CWI-NM-R9104] N92-12568
Local uniform grid refinement for time-dependent partial differential equations
[CWI-NM-R9105] N92-12569
The ODE formulation of hyperbolic PDE's discretized by the spectral collocation method
[FFI-91/7011] N92-12576
PARTIAL PRESSURE
Hydrogen isotopic exchange over palladium metal
[DE90-012063] N92-12076
PARTICLE ACCELERATOR TARGETS
Overview of the Los Alamos National Laboratory Inertial Confinement Fusion Program
[DE92-000199] N92-12731
PARTICLE COLLISIONS
Reciprocity theory of many-body interactions
[IC-AERO-90-01] N92-12620
Strangeness production at 200 GeV/Nucleon
[DE92-000259] N92-12646
Identifying the origin of new gauge bosons at the SSC and LHC
[DE92-000290] N92-12648
Experimental results from studies on nucleus-nucleus collisions at high energy
[DE90-012286] N92-12658
Large Hadron Collider Workshop. Volume 2: Proceedings
[DE91-634595] N92-12663
Atomic and molecular data for metallic impurities in fusion plasmas
[DE90-012213] N92-12688
PARTICLE ENERGY
Kinematic measurement of alpha particles accompanied by spontaneous fission of Cf-252
[ETN-91-90175] N92-12618
Radio telescopes as the detectors of super-high-energy neutrinos N92-12945
PARTICLE IN CELL TECHNIQUE
Three-dimensional particle-in-cell modeling of relativistic electron beam production and transport for KrF laser pumping
[DE90-013050] N92-12247
A concept for treating dense-gas dispersion under realistic conditions of terrain and variable winds
[DE90-012892] N92-12343
PARTICLE INTERACTIONS
Theoretical nuclear physics
[DE92-000022] N92-12615
Reciprocity theory of many-body interactions
[IC-AERO-90-01] N92-12620
An experiment to observe strange particle production in ion collisions at the AGS
[DE92-000135] N92-12636
Measurement of rho, the ratio of the real to imaginary part of the (-p)p forward elastic scattering amplitude, at (radical)s = 1.8 TeV
[DE92-000155] N92-12637
Constraints placed on the Higgs sector from precision electroweak measurements
[DE92-000236] N92-12643
Search for new particles in CDF
[DE92-000638] N92-12655
PARTICLE MASS
Direct measurements of neutrino mass
[DE92-000168] N92-12638
Constraints placed on the Higgs sector from precision electroweak measurements
[DE92-000236] N92-12643
PARTICLE MOTION
Ion stability in bunched electron beams
[DE90-014087] N92-12611
PARTICLE PRODUCTION
An experiment to observe strange particle production in ion collisions at the AGS
[DE92-000135] N92-12636
Unitarity and pion production in relativistic heavy-ion collisions
[DE92-000212] N92-12641
A search for the coherent production of axions in the milli eV range
[DE92-000439] N92-12650
Jet rates from deep inelastic muon scattering in the W range of 15 to 35 GeV
[DE92-000470] N92-12651
Research program in experimental high energy physics, task B
[DE90-013323] N92-12660
PARTICLE SIZE DISTRIBUTION
A semi-analytical model for pressure-time history of granular pyrotechnic materials in a closed system
[DE90-012761] N92-12135
Characterization of a rotating drum for long term studies of aerosols
[FOA-C-40261-4.5] N92-12399
Quasi particles and fermi surfaces of heavy fermion systems
[ETN-91-90180] N92-12619
PARTICLE THEORY
Chemical potential from integral equations using scaled particle theory
[DE90-011277] N92-12075
Research in elementary particle physics
[DE90-013443] N92-12604
Quasi particles and fermi surfaces of heavy fermion systems
[ETN-91-90180] N92-12619
Research program in experimental high energy physics, task B
[DE90-013323] N92-12660
Reflectometry and transport in thermonuclear plasmas in the joint European Torus
[ETN-91-90135] N92-12709
PARTICLE TRACKS
Tracking and vertex finding with drift chambers and neural networks
[DE92-000472] N92-12652
PARTICULATES
Particle measurement and brine chemistry at the Salton Sea Deep Well
[DE92-000031] N92-12337
PASCAL (PROGRAMMING LANGUAGE)
Thermal battery statistics and plotting programs
[DE90-013873] N92-12170
PATHOGENESIS
When is a dose not a dose?
[DE92-000132] N92-12409
PATTERN RECOGNITION
Bulletin of the Division of Electrical Engineering, 1987-1988, volume 3, number 2
[NRC-29078-VOL-3-NO-2] N92-12177
Sensory processing and world modeling for an active ranging device
[NASA-CR-188915] N92-12319
Pattern recognition in biosignals. Application to the sigma spindles in sleep electroencephalograms
[ETN-91-90166] N92-12407
The radon transform for data reduction, line detection, and artificial neural network preprocessing
[DE90-013521] N92-12516
Future ESM systems and the potential for neural processing N92-12526
Algebraic error analysis for surface curvatures of 3-D range images
[NRC-30297] N92-12559
Design and testing of space-domain minimum average correlation energy (SMACE) filters for 2-D acousto-optic correlators
[DE91-019062] N92-12602
Recognition of three dimensional shapes: Application to chemical molecules
[TELECOM-PARIS-90-E-018] N92-12613
PAYLOADS
Vibroacoustic Payload Environment Prediction System (VAPEPS): VAPEPS management center remote access guide
[NASA-CR-189448] N92-12292
PCM TELEMETRY
A PC-based telemetry system for acquiring and reducing data from multiple PCM streams
[DE91-002199] N92-12037
PELLETS
Characteristics of an electron-beam rocket pellet accelerator
[DE92-000073] N92-12053
Tritium proof-of-principle pellet injector
[DE92-000390] N92-12734
PENETRATION
Evidence of weak pair coupling in the penetration depth of bi-based high-Tc superconductors
[DE90-009415] N92-12741
PERFORMANCE PREDICTION
IC defect-sensitivity: Theory and computational models for yield prediction
[UDC-621.382.049.77:681.306(043)] N92-12175
Error analysis of a ratio pyrometer by numerical simulation
[DE90-011500] N92-12229
A general software reliability process simulation technique
[NASA-CR-189037] N92-12482
PERFORMANCE TESTS
Tracking performance requirements for rotorcraft instrument approaches to reduced minima. Phase 1: Preliminary study
[NRC-32137-PHASE-1] N92-11988
Performance improvements and fuel cost savings due to leading edge modification of a vintage delta wing jet fighter
[FFA-TN-1991-22] N92-11993
Humidity effects on gas turbine performance
[NRC-30241] N92-11998
Design of an industrial CT system for very large composite structures
[REPT-911-430-133] N92-12145
Experimental analysis of direct-expansion ground-coupled heat pump systems
[DE92-000420] N92-12226
Use of a standardized test battery for the evaluation of psychomotor performances
[CERMA-90-44(LCBA)] N92-12414
Helmet mounted sight and display testing
[MBB-UD-0594-91-PUB] N92-12421
Helicopter integrated helmet requirements and test results
[MBB-UD-0595-91-PUB] N92-12422
PERIODIC VARIATIONS
Regular variability of the shape of the primary minimum of the orbital light curve of SS 433 with the phase of the precessional period N92-12942
PERMAFROST
Outer continental shelf environmental assessment program. Volume 73: Final Reports of principal investigators
[PB91-204917] N92-12382
PERSONAL COMPUTERS
Advanced laptop and small personal computer technology N92-12029
Three-dimensional forecasting models on a desk-top computer
[DE90-010612] N92-12347
PERTURBATION
Search for planet X N92-12816
PERTURBATION THEORY
Aeroacoustics in inhomogeneous flow field
[FFA-TN-1991-30] N92-12601
The riddle of high-energy baryon number violation
[DE92-000253] N92-12644
PHARMACOLOGY
Pattern recognition in biosignals. Application to the sigma spindles in sleep electroencephalograms
[ETN-91-90166] N92-12407
PHASE CHANGE MATERIALS
Conventional wallboard with latent heat storage for passive solar applications
[DE90-012136] N92-12325
Analysis of wallboard containing a phase change material
[DE90-012163] N92-12326
PHASE DIAGRAMS
Phase diagram of anisotropic two-dimensional quarter-filled band of interacting electrons
[DE90-013171] N92-12748
A liquidus phase diagram for a primitive shergottite N92-12916
PHASE LOCKED SYSTEMS
Method of recertifying a loaded bearing member
[NASA-CASE-LAR-14168-1] N92-12302
PHASE MATCHING
Molecular to material design for anomalous-dispersion phase-matched second harmonic generation
[DE91-017999] N92-12683
PHASE MODULATION
Study of advanced techniques in modulation and coding for digital beam frequencies with large spectral effectiveness
[TELECOM-PARIS-90-E-020] N92-12152
Joint carrier phase estimation and symbols decoding of trellis codes
[TELECOM-PARIS-91-C-003] N92-12473
PHASE SHIFT
First order tune shift calculations for transverse betatron dynamics
[DE92-000370] N92-12668
Soft x-ray measurement of internal tearing mode structure in a reversed-field pinch
[DE92-000164] N92-12729
PHASE TRANSFORMATIONS
Designing precipitation-strengthened iron-aluminides for high-temperature applications
[DE90-013832] N92-12100
Ageing characteristics of dendritic and non-dendritic (stir-cast) Zn-Al alloy (ZA-27)
[NRC-28906] N92-12107
Synthesis of Al/Al3Ti two-phase alloys by mechanical alloying
[DE92-000193] N92-12117

Computer modeling of arc welds to predict effects of critical variables on weld penetration
[DE92-000428] N92-12283
Nonsingular integral equation for two-body scattering and applications in two and three dimensions N92-12625
Specific heat of La(2-x)Sr(x)CuO4; volume fraction of superconductivity; possible structural transition at 45 K
[DE90-011585] N92-12744
Forming process of 110 K high-Tc phase in Bi-Pb-Sr-Ca-Cu-O system
[DE91-628642] N92-12761

PHOSPHORUS
Electroless vs electrodeposited Ni-P alloys for diamond turning applications
[DE91-018999] N92-12113

PHOTOCHEMICAL REACTIONS
Local states in one-dimensional CDW (Charge Density Wave) materials: Spectral signatures for polarons and bipolarons in MX chains
[DE90-013150] N92-12605

PHOTOCONDUCTIVITY
Gold sulfide replacements of cyanide solutions
[DE91-017981] N92-12111
Tests on photoconductive semiconductor switches for subnanosecond risetime, multimegavolt pulser applications
[DE91-018797] N92-12190

PHOTOCONDUCTORS
Recovery of high field GaAs photoconductive semiconductor switches
[DE90-013062] N92-12163

PHOTODISSOCIATION
Laser studies of the photodissociation dynamics of cometary radicals N92-12823

PHOTOELASTIC ANALYSIS
Photoelastic coating method strain survey of cruciform specimen
[NRC-LTR-ST-1747] N92-12123

PHOTOELASTIC MATERIALS
Photoelastic coating method strain survey of cruciform specimen
[NRC-LTR-ST-1747] N92-12123

PHOTOELECTRIC EMISSION
Design and study of photon-assisted heteroepitaxial growth system
[LAAS-91187] N92-12753

PHOTOELECTRICITY
Physical studies of small asteroids and cometary nuclei N92-12855

PHOTOELECTRON SPECTROSCOPY
Random uncertainties in the surface spectroscopies
[NPL-DMM(A)-26] N92-12087

PHOTOGRAMMETRY
Geologic mapping of tunnels using photogrammetry-control-point configuration
[DE91-019071] N92-12323

PHOTOGRAPHY
Effects of ambient background gases on YBCO plume propagation under film growth conditions: Spectroscopic, ion probe, and fast photographic studies
[DE92-000431] N92-12737

PHOTOIONIZATION
Photoionization of intergalactic gas and cooling flows in clusters of galaxies N92-12896

PHOTOLYSIS
Nitrogen dioxide fluorescence following photolysis in a supersonic jet
[DE90-014164] N92-12078
Laser studies of the photodissociation dynamics of cometary radicals N92-12823

PHOTOMETERS
Allegheny Observatory search for planetary systems N92-12812

PHOTOMETRY
Analysis and interpretation of CCD data on P/Halley and physical parameters and activity status of cometary nuclei at large heliocentric distance N92-12797
Photometry of Pluto-Charon mutual events and Hirayama family asteroids N92-12799
Studies of asteroids, comets, and Jupiter's outer satellites N92-12800
Asteroid photometry N92-12817

PHOTON BEAMS
Workshop on High Heat Load X Ray Optics
[DE90-011799] N92-12673

PHOTONICS
A high-efficiency neutron coincidence counter for small samples
[DE92-000183] N92-12639

PHOTONS
A search for the coherent production of axions in the milli eV range
[DE92-000439] N92-12650
A wall stabilized arc as a light source for spectroscopic techniques
[ETN-91-90308] N92-12715
Photon enhanced chemical vapor deposition of carbon based thin films from toluene vapor N92-12720

PHOTOPRODUCTION
Studies of complex fragment emission in heavy ion reactions
[DE92-000532] N92-12653

PHOTOSYNTHESIS
Division of Energy Biosciences: Summaries of FY 1991 activities
[DE92-000518] N92-12401

PHOTOVOLTAIC CONVERSION
Photovoltaics: New opportunities for utilities
[DE91-002168] N92-12334
Research on stable, high-efficiency, amorphous silicon multijunction modules
[DE91-015002] N92-12335

PHYSICAL CHEMISTRY
Physicochemical investigation of the compatibilization of polyolefin/polyamide blends: Morphology, thermal analysis, and specific interactions
[NRC-29455] N92-12124

PHYSICAL OPTICS
An astigmatic unstable resonator with an intracavity deformable mirror
[DE91-018815] N92-12257

PHYSICAL PROPERTIES
Infrared observations of solar system objects N92-12828
Physical processes in comets N92-12835

PHYSIOLOGICAL EFFECTS
Evaluation of the physiological effects of an additional dead space involved in wearing an anti-smoke mask
[REPT-9/CEV/SE/LAMAS] N92-12420

PHYSIOLOGICAL FACTORS
Ejection systems and the human factor: A guide for flight surgeons and aeromedical trainers
[DCIEM-88-TR-16] N92-11986

PHYSIOLOGICAL RESPONSES
Cosmos-1989 immunology studies
[NASA-CR-188970] N92-12389
Effect of space flight on interferon production - mechanistic studies
[NASA-CR-188972] N92-12390

PHYSIOLOGICAL TESTS
Ames life science telescience testbed evaluation
[NASA-CR-188856] N92-12033
Evaluation of the Aerazur multifunctional flight suit in centrifugal tests
[REPT-38/CEV/SE/LAMAS] N92-12419

PIEZOELECTRICITY
An analytical and experimental study to investigate flutter suppression via piezoelectric actuation
[NASA-TM-893240] N92-12173
Piezoelectric devices using sol gel thin films
[NRC-31370] N92-12751

PIONEER VENUS 1 SPACECRAFT
Planning systems for pioneer mission control N92-12021

PIONEER 10 SPACE PROBE
Planning systems for pioneer mission control N92-12021

PIONEER 11 SPACE PROBE
Planning systems for pioneer mission control N92-12021

PIONS
Unitarity and pion production in relativistic heavy-ion collisions
[DE92-000212] N92-12641

PIPES (TUBES)
Cryogenic testing of fluoropolymer-coated stainless steel tubing
[DE90-008022] N92-12098
Evaluation of the fabricability of advanced austenitic tubing
[DE91-017158] N92-12109
The effect of working process on hydrogenate orientation of Zr-4 alloy tube
[DE91-629474] N92-12114

PISTON THEORY
On simple aerodynamic sensitivity derivatives for use in interdisciplinary optimization
[NASA-TM-104145] N92-11985

PITCHING MOMENTS
Pitching moment derivative due to rate of pitch for projectiles at supersonic speeds
[ESDU-91004] N92-11967

PLANE STRAIN
Million-atom plane-strain indentation studies via nonequilibrium molecular dynamics
[DE90-012075] N92-12095

PLANE WAVES
Hypervelocity explosive launchers
[DE90-011713] N92-12036

PLANET EPHEMERIDES
Asteroid absolute magnitudes and slope parameters N92-12888

PLANETARY ATMOSPHERES
Reports of planetary astronomy, 1991
[NASA-TM-4329] N92-12792
Planetary astronomy N92-12804
Volatiles in the outer solar system N92-12807
Planetary Spectroscopy N92-12811
Interiors and atmospheres of the outer planets N92-12821
Studies of extended planetary atmospheres N92-12822
Advanced infrared astronomy N92-12826
Outer planet studies N92-12829
Radiative transfer in planetary atmospheres N92-12842
Planetary optical and infrared imaging N92-12849
Studies of thermal wave phenomena on the Jovian planets N92-12867
Radiative transfer in planetary atmospheres: Submillimeter-wave spectroscopy of comets N92-12885
Tentative identification of a newly discovered class of material on Io N92-12892

PLANETARY COMPOSITION
Theoretical spectroscopy of comets N92-12794
Infrared observations of small solar system bodies N92-12802
Planetary astronomy N92-12804
Physical observations of comets: Their composition, origin and evolution N92-12805
Radial velocity detection of extra-solar planetary systems N92-12806
Volatiles in the outer solar system N92-12807
Planetary optical and infrared imaging N92-12849
The origin of amorphous rims on lunar plagioclase grains: Solar wind damage or vapor condensates N92-12918

PLANETARY EVOLUTION
Infrared spectral studies of asteroids N92-12796
Studies of asteroids, comets, and Jupiter's outer satellites N92-12800
Physical observations of comets: Their composition, origin and evolution N92-12805
Radial velocity detection of extra-solar planetary systems N92-12806
Infrared observations of solar system objects N92-12828
Cs-135 - Ba-135: A new cosmochronometric constraint on the origin of the Earth and the astrophysical site of the origin of the solar system N92-12915
Fractionation of terrestrial neon by hydrodynamic hydrogen escape from ancient steam atmospheres N92-12931

PLANETARY GEOLOGY
Microprobe studies of microtomed particles of white druse salts in shergottite EETA 79001 N92-12921

PLANETARY MAGNETOTAILS
Evolution on large-scale plasma structures in comets: Kinematics and physics N92-12801

PLANETARY MANTLES
Nd-142/Nd-144 in SNCs and early differentiation of a heterogeneous Martian mantle N92-12925

PLANETARY ORBITS
Radial velocity detection of extra-solar planetary systems N92-12806
Palomar Planet-Crossing Asteroid Survey (PCAS) N92-12819

PLANETARY RINGS
Occultation studies of the solar system N92-12810
Occultation studies of the solar system N92-12834
Radiative transfer in planetary atmospheres N92-12842

PLANETARY ROTATION
Asteroid photometry N92-12817

PLANETARY STRUCTURE
Planetary astronomy N92-12804
Interiors and atmospheres of the outer planets N92-12821
Outer planet studies N92-12829

PLANETARY SURFACES
Volatiles in the outer solar system N92-12807
Asteroid photometry N92-12817

PLANETARY SYSTEMS
Allegheny Observatory search for planetary systems N92-12812
The radial velocity search for extrasolar planets N92-12832

PLANETARY TEMPERATURE
Studies of thermal wave phenomena on the Jovian planets N92-12809

PLANETS
Occultation studies of the solar system N92-12834
Astrometric observations of comets and minor planets N92-12854

Minor planet 1566 Icarus: Asteroid or comet? N92-12895

PLANNING
Planning and reasoning in the JPL telerobot testbed [NASA-CR-189038] N92-12278
Interactive Office user's manual [NASA-CR-184203] N92-12447

PLANTS (BOTANY)
Division of Energy Biosciences: Summaries of FY 1991 activities [DE92-000518] N92-12401

PLASMA ARC WELDING
The variable polarity plasma arc welding process: Characteristics and performance [NASA-CR-184259] N92-12279

PLASMA CONTROL
Effect of the equilibrium magnetic field on plasma edge fluctuations [DE90-012720] N92-12692
Plasma properties [DE90-012865] N92-12693
Papers presented at Seventh International Workshop on Stellarators [DE90-625560] N92-12698
West European magnetic confinement fusion research [DE90-010911] N92-12704
The Ion Cyclotron Heating (ICH) system for BPX [DE92-000426] N92-12736

PLASMA CURRENTS
On the theory of impulse breakdown in gases [NRC-31510] N92-12711
Inductive currents in an RF driven plasma [DE92-000491] N92-12738

PLASMA DENSITY
A novel scanning interferometer for two-dimensional plasma density measurements [DE90-625514] N92-12697
The multipulse Thomson scattering diagnostic on the D3-D tokamak [DE92-000262] N92-12732

PLASMA DIAGNOSTICS
Measurements of laser wavelength scaling ion acoustic decay instability and associated effects in laser-plasma interaction experiments [DE90-011434] N92-12691
MTX (Microwave Tokamak Experiment) data acquisition and analysis computer network [DE90-013066] N92-12694
MTX (Microwave Tokamak Experiment) diagnostics and timing system for FEL (Free Electron Laser) heating experiments [DE90-013067] N92-12695
Phenomenology, diagnostics, and non-LTE effects in plasma-particle interactions [DE90-013088] N92-12701
Measurement of magnetic fluctuations at small spatial scales in the Tokapole 2 tokamak [DE92-000161] N92-12728
The multipulse Thomson scattering diagnostic on the D3-D tokamak [DE92-000262] N92-12732

PLASMA DRIFT
Papers presented at Seventh International Workshop on Stellarators [DE90-625560] N92-12698

PLASMA DYNAMICS
Plasma properties [DE90-012865] N92-12693
Nonlinear resonant absorption and wave breaking (Vlasov simulation of resonance excited plasma waves) [ETN-91-90172] N92-12714

PLASMA ELECTRODES
Calculated non-linear magnetic field penetration of plasma opening switches [DE90-013156] N92-12166

PLASMA EQUILIBRIUM
Effect of the equilibrium magnetic field on plasma edge fluctuations [DE90-012720] N92-12692
Plasma properties [DE90-012865] N92-12693
Studies of fine structure of discharge region on HT-6B tokamak device [DE91-628421] N92-12723
Inductive currents in an RF driven plasma [DE92-000491] N92-12738

PLASMA HEATING
MTX (Microwave Tokamak Experiment) diagnostics and timing system for FEL (Free Electron Laser) heating experiments [DE90-013067] N92-12695
Phenomenology, diagnostics, and non-LTE effects in plasma-particle interactions [DE90-013088] N92-12701
Reflectometry and transport in thermonuclear plasmas in the joint European Torus [ETN-91-90135] N92-12709
The Ion Cyclotron Heating (ICH) system for BPX [DE92-000426] N92-12736
Inductive currents in an RF driven plasma [DE92-000491] N92-12738

PLASMA INTERACTIONS
Imaging studies of comets N92-12836

PLASMA JETS
A wall stabilized arc as a light source for spectroscopic techniques [ETN-91-90308] N92-12715
Characteristic quantitites of a cascade arc used as a light source for spectroscopic techniques N92-12716
The continuum emission of an arc plasma N92-12717
The VUV emissivity of a high pressure cascade argon arc from 125 to 200 nm N92-12718
Infrared and ultraviolet spectroscopic ellipsometry using a cascaded arc as light source N92-12719
The a-Si:H films produced by an expanding argon-silane plasma investigated with spectroscopic infrared ellipsometry N92-12721

PLASMA PHYSICS
Plasma properties [DE90-012865] N92-12693
The last disconnection events in Comet Halley in April 1986 N92-12862

PLASMA PINCH
Soft x-ray measurement of internal tearing mode structure in a reversed-field pinch [DE92-000164] N92-12729

PLASMA PROBES
A novel scanning interferometer for two-dimensional plasma density measurements [DE90-625514] N92-12697

PLASMA RADIATION
Third plasma harmonic radiation in type 2 bursts [MPE-PREPRINT-203] N92-12982

PLASMA TURBULENCE
Resistive MHD turbulence [DE90-012935] N92-12700
Measurement of magnetic fluctuations at small spatial scales in the Tokapole 2 tokamak [DE92-000161] N92-12728

PLASMA WAVES
Calculated non-linear magnetic field penetration of plasma opening switches [DE90-013156] N92-12166
Papers presented at Seventh International Workshop on Stellarators [DE90-625560] N92-12698
Nonlinear resonant absorption and wave breaking (Vlasov simulation of resonance excited plasma waves) [ETN-91-90172] N92-12714

PLASMA-PARTICLE INTERACTIONS
Atomic and molecular data for metallic impurities in fusion plasmas [DE90-012213] N92-12688
Phenomenology, diagnostics, and non-LTE effects in plasma-particle interactions [DE90-013088] N92-12701

PLASMAS (PHYSICS)
Richtmyer-Meshkov instability of shocked gaseous interfaces [DE92-000308] N92-12225
Magnetic field structure near the plasma boundary in helical systems and divertor tokamaks [NIFS-17] N92-12708
On the theory of impulse breakdown in gases [NRC-31510] N92-12711
Simple model of the gaseous plasma and its soliton solutions [NRC-30824] N92-12712
HL-1 tokamak data acquisition system and its initial application in the physical experiment [DE91-630701] N92-12725
Overview of the Los Alamos National Laboratory Inertial Confinement Fusion Program [DE92-000199] N92-12731
Electromagnetic loads on ITER in-vessel components [DE92-000672] N92-12739

PLASTIC DEFORMATION
Million-atom plane-strain indentation studies via nonequilibrium molecular dynamics [DE90-012075] N92-12095
Ductile-brittle transition temperature testing of tungsten using the three-point bend test [DE92-000099] N92-12116
Determination of the impact fracture parameters in ductile polymers [NRC-28433] N92-12128

PLASTIC PROPERTIES
On the formation of a joint during cold welding [DE91-017672] N92-12275
Numerical simulation of plasticity at high strain rate [DE91-011403] N92-12314

PLATE THEORY
An analytical and experimental study to investigate flutter suppression via piezoelectric actuation [NASA-TM-893240] N92-12173

PLATES (STRUCTURAL MEMBERS)
An analytical and experimental study to investigate flutter suppression via piezoelectric actuation [NASA-TM-893240] N92-12173
A general nonlinear theory of large elastic deformation of layered plates N92-12296
An experimental and numerical study of delamination propagation and arrest in composite beams and plates when subjected to low-velocity impact N92-12299

PLOTTERS
Interpreting measurements obtained with the cloud absorption radiometer [NASA-CR-189241] N92-12366

PLUMES
Phenomenology, diagnostics, and non-LTE effects in plasma-particle interactions [DE90-013088] N92-12701
Effects of ambient background gases on YBCO plume propagation under film growth conditions: Spectroscopic, ion probe, and fast photographic studies [DE92-000431] N92-12737

PLUTO (PLANET)
Photometry of Pluto-Charon mutual events and Hirayama family asteroids N92-12799
Visual and infrared studies of asteroids and the Pluto-Charon system N92-12848
Studies of Triton and the Pluto-Charon system N92-12850

PNEUMATICS
Development of a pneumatic high-angle-of-attack flush airdata sensing (HI-FADS) system [NASA-TM-104241] N92-11994

POINT SOURCES
On the origin of the diffuse x ray background N92-12952

POISSON DENSITY FUNCTIONS
System-based component test problem: The design of optimum system based component test plans N92-12587

POISSON EQUATION
The state variable method as a unifying approach to the study of semiconductor devices [REPT-90-045] N92-12187
Mobile charge and electric field distributions in abrupt PN junctions: An approach with the state variable method [REPT-90-051] N92-12188

POISSON RATIO
Identification of complex modules in othotropic materials by means of free vibration analysis [REPT-911-550-101] N92-12311

POLARIMETRY
Ground-based millimeter wave Cloud Profiling Radar System (CPRS) [DE91-018373] N92-12159
Microwave remote sensing and radar polarization signatures of natural fields [NASA-CR-189249] N92-12317

POLARIZATION (CHARGE SEPARATION)
Molecular to material design for anomalous-dispersion phase-matched second harmonic generation [DE91-017999] N92-12683

POLARIZATION (SPIN ALIGNMENT)
Recent (e,2e) studies: Laser excited atoms, autoionization, Auger processes, and thin films [DE91-634156] N92-12614

POLARIZATION CHARACTERISTICS
Microwave remote sensing and radar polarization signatures of natural fields [NASA-CR-189249] N92-12317

POLARONS
Local states in one-dimensional CDW (Charge Density Wave) materials: Spectral signatures for polarons and bipolarons in MX chains [DE90-013150] N92-12605

POLLUTION CONTROL
Recent trends in waste-reduction efforts in the US manufacturing sector [DE92-000197] N92-12357

POLLUTION MONITORING
Objective method for assessing monitoring networks [DE90-505577] N92-12346
Three-dimensional forecasting models on a desk-top computer [DE90-010612] N92-12347

POLLUTION TRANSPORT
Three-dimensional forecasting models on a desk-top computer [DE90-010612] N92-12347

POLYAMIDE RESINS
Physicochemical investigation of the compatibilization of polyolefin/polyamide blends: Morphology, thermal analysis, and specific interactions
[NRC-29455] N92-12124
Processing-morphology relationships of compatibilized polyolefin/polyamide blends. Part 1: The effect of an ionomer compatibilizer on blend morphology
[NRC-29094-PT-1] N92-12127
POLYCARBONATES
Determination of the impact fracture parameters in ductile polymers
[NRC-28433] N92-12128
POLYETHYLENES
Diffraction by macromolecular fluids
[DE91-016219] N92-12089
Physicochemical investigation of the compatibilization of polyolefin/polyamide blends: Morphology, thermal analysis, and specific interactions
[NRC-29455] N92-12124
Processing-morphology relationships of compatibilized polyolefin/polyamide blends. Part 1: The effect of an ionomer compatibilizer on blend morphology
[NRC-29094-PT-1] N92-12127
Determination of the impact fracture parameters in ductile polymers
[NRC-28433] N92-12128
The far infrared optical constants of some common polymers
[NPL-DES-111] N92-12682
POLYIMIDE RESINS
A process for preparing an assembly of an article and a soluble polyimide which resists dimensional change, delamination, and debonding when exposed to changes in temperature
[NASA-CASE-LAR-14763-1] N92-12121
POLYIMIDES
A process for preparing an assembly of an article and a soluble polyimide which resists dimensional change, delamination, and debonding when exposed to changes in temperature
[NASA-CASE-LAR-14763-1] N92-12121
POLYMER BLENDS
Electron beam irradiation of polymer blends
[ETN-91-90139] N92-12122
Processing-morphology relationships of compatibilized polyolefin/polyamide blends. Part 1: The effect of an ionomer compatibilizer on blend morphology
[NRC-29094-PT-1] N92-12127
Fractional crystallization in polymer mixing
[ETN-91-90184] N92-12129
POLYMER MATRIX COMPOSITES
Physicochemical characterization of high-performance fibre-reinforced organic-matrix composites. Part 6: Methods for quality control of matrix chemistry
[NRC-28667-PT-6] N92-12061
Tensile properties of injection molded long fiber thermoplastic composites
[NRC-29456] N92-12062
Crystallization behavior and effect of thermal history on fracture performance of glass flake reinforced polypropylene
[NRC-29450] N92-12752
POLYMERIC FILMS
Cryogenic testing of fluoropolymer-coated stainless steel tubing
[DE90-008022] N92-12098
POLYMERIZATION
Modelling the cure of Narmco 5208: A method for determining the chemical state of the prepreg
[NRC-29449] N92-12126
POLYMETHYL METHACRYLATE
Shock characterization of nitrocellulose-based gun propellant
[DE91-019057] N92-12137
POLYNOMIALS
Consistency conditions and representations of a q-deformed Virasoro algebra
[DE90-013715] N92-12359
From knots to quantum groups (and back)
[DE90-013688] N92-12591
Consistent multiparameter quantisation of GL(n)
[DE90-013689] N92-12592
POLYPHENYLS
A scintillation detector for measuring inert gas beta rays
[DE91-630700] N92-12634
POLYPROPYLENE
Physicochemical investigation of the compatibilization of polyolefin/polyamide blends: Morphology, thermal analysis, and specific interactions
[NRC-29455] N92-12124
The far infrared optical constants of some common polymers
[NPL-DES-111] N92-12682
Crystallization behavior and effect of thermal history on fracture performance of glass flake reinforced polypropylene
[NRC-29450] N92-12752
POLYSTYRENE
Ultrasonic investigation of amorphous polymers (polystyrene) in a wide range of temperature and pressure. 1: Introduction, method, technique, and results
[NRC-29718] N92-12125
The far infrared optical constants of some common polymers
[NPL-DES-111] N92-12682
POLYTETRAFLUOROETHYLENE
The far infrared optical constants of some common polymers
[NPL-DES-111] N92-12682
POPULATIONS
The estimation of the dose from cosmic radiation received by the population living at mainland of China
[DE91-631668] N92-12985
POROSITY
Controlled microstructure oxide coating for chemical sensors
[DE90-012223] N92-12119
PORTABLE EQUIPMENT
Advanced laptop and small personal computer technology N92-12029
A system for calibrating the wrist-mounted laser range finder
[NRC-29799] N92-12252
POSITION INDICATORS
Position and velocity measuring system
[AD-D014975] N92-12232
POSITION SENSING
Design and development of proprioceptive sensors to be used for mobile robot localization
[LAAS-91178] N92-12238
POSITIONING
Precise relative sea surface positioning of a floating platform using the Global Positioning System (GPS) N92-11987
POSITIVE IONS
Laboratory simulation of the surface of Halley's Comet N92-12872
POSITRONS
On two-dimensional relativistic stellar winds N92-12947
Nucleosynthetic gamma ray lines and positrons from supernovae N92-12983
POTABLE WATER
Production of desalinated water using ocean thermal energy
[DE91-018894] N92-12336
POTASSIUM
Observational studies of the exospheres of the Moon and Mercury N92-12839
Sodium and potassium in the lunar atmosphere N92-12884
POTASSIUM PERCHLORATES
Compaction of TiH(1.65)/KClO4 pyrotechnic powder during confined burn
[DE90-013199] N92-12136
POTENTIAL ENERGY
Chemical potential from integral equations using scaled particle theory
[DE90-011277] N92-12075
POTENTIAL FIELDS
The state variable method as a unifying approach to the study of semiconductor devices
[REPT-90-045] N92-12187
Cooling of ions trapped in potential wells produced by electromagnetic radiation fields
[DE91-631104] N92-12635
POTENTIAL THEORY
Chemical potential from integral equations using scaled particle theory
[DE90-011277] N92-12075
POWDER (PARTICLES)
A semi-analytical model for pressure-time history of granular pyrotechnic materials in a closed system
[DE90-012761] N92-12135
Compaction of TiH(1.65)/KClO4 pyrotechnic powder during confined burn
[DE90-013199] N92-12136
POWDER METALLURGY
A brief review of wrought aluminum alloy metal matrix composites reinforced by silicon carbide whiskers
[NRC-LTR-ST-1765] N92-12058
POWER LINES
Immunological and biochemical effects of 60 Hz electric and magnetic fields in humans
[DE90-012546] N92-12402
Immunological and biochemical effects of 60 Hz electric and magnetic fields in humans
[DE90-012547] N92-12403
Magnetic field in the SSC arc quad
[DE92-000656] N92-12670
POWER REACTORS
Recent progress in the development of materials for fusion reactors
[DE91-016283] N92-12722
POWER SPECTRA
Quasi-periodic oscillations in low-mass x ray binaries N92-12958
POWER TRANSMISSION
Magnetic field in the SSC arc quad
[DE92-000656] N92-12670
PRASEODYMIUM COMPOUNDS
Properties of epitaxial YBa2Cu3O(7-delta)-based superconducting superlattices
[DE92-000423] N92-12765
Laser ablation synthesis and properties of epitaxial YBa2Cu3O(7-delta) / PrBa2Cu3O(7-delta) superconducting superlattices
[DE92-000447] N92-12766
PRECESSION
X-ray observations of SS 433 and the QSO MR 2251-178 N92-12789
On the observational appearances of a freely precessing neutron star in Hercules X-1 N92-12963
PRECIPITATION HARDENING
Designing precipitation-strengthened iron-aluminides for high-temperature applications
[DE90-013832] N92-12100
PRECONDITIONING
Motivating quasi-Newton updates by preconditioned conjugate gradient methods
[MATHS-REPT-A-150] N92-12577
PREDICTION ANALYSIS TECHNIQUES
Internal dynamics of electrical discharges
[DE90-013161] N92-12169
Error analysis of a ratio pyrometer by numerical simulation
[DE90-011500] N92-12229
Vibroacoustic Payload Environment Prediction System (VAPEPS): VAPEPS management center remote access guide
[NASA-CR-189448] N92-12292
A feasibility study of using ABAQUS finite element analysis for creep with microstructural material damage
[NRC-LTR-ST-1791] N92-12305
Comparison of some different formulae for ground shock prediction
[FFI-90/4006] N92-12363
A minimum prediction error algorithm for estimation of periodic ARMA models
[REPT-90-016] N92-12573
Spectral factorization of linear periodic systems with application to the optimal prediction of periodic ARMA models
[REPT-90-013] N92-12768
Occultation studies of the solar system N92-12834
PREDICTIONS
A method for multiaxial fatigue life prediction using energy approaches
[DE91-018851] N92-12315
Computer aided design of weapon system guidance and control with predictive functional control technique N92-12463
Constrained receding-horizon predictive control
[REPT-90-062] N92-12551
PREDICTOR-CORRECTOR METHODS
Parallel diagonally implicit Runge-Kutta-Nystroem methods
[CWI-NM-R9103] N92-12567
PREPARATION
Research needs for improvement of protection against explosive or toxic industrial chemicals hazards
[FOA-C-40286-4.5] N92-12147
PREPREGS
Modelling the cure of Narmco 5208: A method for determining the chemical state of the prepreg
[NRC-29449] N92-12126
PREPROCESSING
The radon transform for data reduction, line detection, and artificial neural network preprocessing
[DE90-013521] N92-12516
PRESERVING
An evaluation of the potential of combination processes involving heat and irradiation for food preservation
[DE91-638734] N92-12423
PRESSURE DEPENDENCE
Properties of liquid water and carbon dioxide from constant pressure-constant temperature molecular dynamics
[DE91-018219] N92-12633
Pressure dependence of the specific heat of heavy-fermion YbCu4.5
[DE90-011584] N92-12742

PRESSURE DISTRIBUTION
Blade surface pressure measurements on the rotor of a model turbine stage in a transient flow facility N92-12206
Waves and fields in structural acoustics: Fluid-loaded elastic cylindrical and spherical shells N92-12597
PRESSURE EFFECTS
Ultrasonic investigation of amorphous polymers (polystyrene) in a wide range of temperature and pressure. 1: Introduction, method, technique, and results [NRC-29718] N92-12125
Shock characterization of nitrocellulose-based gun propellant [DE91-019057] N92-12137
Modification of amino acids at shock pressures of 3 to 30 GPA: Initial results N92-12926
PRESSURE GRADIENTS
A database for the Geysers geothermal field [DE90-013811] N92-12330
PRESSURE MEASUREMENT
Hydrogen isotopic exchange over palladium metal [DE90-012063] N92-12076
A semi-analytical model for pressure-time history of granular pyrotechnic materials in a closed system [DE90-012761] N92-12135
Blade surface pressure measurements on the rotor of a model turbine stage in a transient flow facility N92-12206
Velocity and pressure characteristics of a model SSME high pressure fuel turbopump [NASA-CR-184239] N92-12273
PRESSURE OSCILLATIONS
Extended range forecast of Atlantic seasonal hurricane activity for 1992 N92-12377
PRESSURE SENSORS
Development of a pneumatic high-angle-of-attack flush airdata sensing (HI-FADS) system [NASA-TM-104241] N92-11994
Study and development of a pressure and acceleration sensor using a piezoelectric polymer (PVDF) [LAAS-91154] N92-12237
PRESSURE SUITS
Evaluation of the Aerazur multifunctional flight suit in centrifugal tests [REPT-38/CEV/SE/LAMAS] N92-12419
PRESSURE VESSELS
Electromagnetic loads on ITER in-vessel components [DE92-000672] N92-12739
PRINTED CIRCUITS
Optimal realization of multistage cascade circuits [ETN-91-90165] N92-12182
PROBABILITY THEORY
Uncertainty analysis report for Ulysses, volume 1 [DE91-013476] N92-12039
Reasoning with uncertain and incomplete information in aerospace applications N92-12544
Diagnostic reasoning techniques for selective monitoring [NASA-CR-189446] N92-12549
Research in elementary particle physics [DE90-013443] N92-12604
Practical implications of theories of uncertainty for uncertainty elicitation [DE91-017949] N92-12782
Prospects in extended inflation N92-12900
PROBLEM SOLVING
Mission critical technology development N92-12031
A synergistic approach to reasoning for autonomous satellites N92-12522
Convexly constrained ill posed problems and their regularization, using iterative processes [ETN-91-90156] N92-12560
Differential periodic Riccati equations: A note on the existence of an infinite number of periodic strong solutions [REPT-90-020] N92-12574
Solving the discretized time-independent Schroedinger equation in the Lanczos procedure N92-12630
PROCEDURES
NASA reliability preferred practices for design and test [NASA-TM-4322] N92-12286
PROCESS CONTROL (INDUSTRY)
CAD/CAM activities at NRC: 1988 [NRC-29225] N92-12477
PRODUCT DEVELOPMENT
Requirements and traceability management N92-12453
PRODUCTION MANAGEMENT
Decision support system development using a migration approach [DE91-018860] N92-12774
PROGRAM VERIFICATION (COMPUTERS)
Numerical verification of NISA 2 finite element analysis of the cracked 5th stage compressor disc of J-85 jet engine [NRC-LTR-ST-1792] N92-11997
Formal verification of a redundancy management algorithm N92-12457
Development and verification of software for flight safety critical systems N92-12469
A general software reliability process simulation technique [NASA-CR-189037] N92-12482
PROGRAMMING LANGUAGES
Network programming: A design method and programming strategy for large software systems N92-12459
Embedding as a tool for language comparison [CWI-CS-R9102] N92-12483
DBMS problems on the evolution of relational model to object model [REPT-90-069] N92-12488
Enhanced use of CLIPS at the Los Alamos National Laboratory [DE92-000305] N92-12493
JAZELLE: An enhanced data management system for high energy physics [DE90-013571] N92-12662
PROJECT MANAGEMENT
Control center operations at the Goddard Space Flight Center N92-12023
Lessons learned in control center technologies and non-technologies N92-12026
Basic energy sciences: Summary of accomplishments [DE90-011269] N92-12327
Solar array management guide [REPT-911-440-114] N92-12778
PROJECT PLANNING
Combined Release and Radiation Effects Satellite (CRRES) Experiment: Educational planning and coordination [NASA-CR-184255] N92-12362
Goldstone solar system radar N92-12824
Planetary astronomy N92-12844
Georgian space research program N92-12955
PROJECTILES
Shock characterization of nitrocellulose-based gun propellant [DE91-019057] N92-12137
Determination of the contact forces between a projectile and a hard target [DE91-018354] N92-12281
Adaptation of an industrial application for an instructional laboratory in mechanical vibrations [DE90-013692] N92-12295
Investigations of nuclear structure and nuclear reactions induced by complex projectiles [DE92-000533] N92-12654
PROMOTION
Mutagenic analysis of the S. fradiae beta-lactamase promoter N92-12397
Chromogenic identification of promoters in Streptomyces lividans by using an ampC beta-lactamase promoter-probe vector N92-12398
PROPAGATION MODES
The characters of slab lasers [DE90-625397] N92-12246
Analysis of cladded uniaxial single crystal fibers [NRC-32596] N92-12678
PROPELLANT TANKS
Centaur in-tank explosion flow fields within STS and Titan 4 payload spaces [NASA-CR-189039] N92-12144
PROPORTIONAL COUNTERS
X ray emission from active galactic nuclei N92-12962
PROPRIOCEPTORS
Design and development of proprioceptive sensors to be used for mobile robot localization [LAAS-91178] N92-12238
PROPULSION
An integrated energy approach to providing power and propulsion for the Space Exploration Initiative [DE92-000143] N92-12054
Composite load spectra for select space propulsion structural components [NASA-CR-189048] N92-12306
PROPULSION SYSTEM CONFIGURATIONS
The design and performance estimates for the propulsion module for the booster of a TSTO vehicle [NASA-TM-105299] N92-11995
An integrated energy approach to providing power and propulsion for the Space Exploration Initiative [DE92-000143] N92-12054
Probabilistic Structural Analysis Methods (PSAM) for select space propulsion systems components [NASA-CR-187199] N92-12307
PROPULSION SYSTEM PERFORMANCE
The design and performance estimates for the propulsion module for the booster of a TSTO vehicle [NASA-TM-105299] N92-11995
A derivation of gross thrust for a sea-level jet engine test cell [NRC-30165] N92-12001
An integrated energy approach to providing power and propulsion for the Space Exploration Initiative [DE92-000143] N92-12054
Probabilistic Structural Analysis Methods (PSAM) for select space propulsion systems components [NASA-CR-187199] N92-12307
The need for superconducting magnets for MHD seawater propulsion [DE90-013651] N92-12705
PROTECTIVE CLOTHING
Evaluation of the Aerazur multifunctional flight suit in centrifugal tests [REPT-38/CEV/SE/LAMAS] N92-12419
PROTECTIVE COATINGS
Structures and fracture mechanic of brittle matrix composites [REPT-911-430-131] N92-12064
High-temperature corrosion of Nicalon(tm)/SiC composites [DE92-000281] N92-12071
Cryogenic testing of fluoropolymer-coated stainless steel tubing [DE90-008022] N92-12098
PVD layers for corrosion protection of high strength Al-alloys [MBB-Z-0360-91-PUB] N92-12108
Effects of oxide layers on optical properties and x ray hardness of Al-Be mirrors [DE92-000476] N92-12687
PROTEIN CRYSTAL GROWTH
Protein crystal growth in low gravity [NASA-CR-188974] N92-12141
PROTEINS
Protein crystal growth in low gravity [NASA-CR-188974] N92-12141
PROTOCOL (COMPUTERS)
Los Alamos National Laboratory's high-performance data system [DE92-000223] N92-12442
PROTON BEAMS
First order tune shift calculations for transverse betatron dynamics [DE92-000370] N92-12668
PROTONS
Theoretical nuclear physics [DE92-000022] N92-12615
Measurement of rho, the ratio of the real to imaginary part of the (-p)p forward elastic scattering amplitude, at (radical)s = 1.8 TeV [DE92-000155] N92-12637
Thermal generation and mobility of charge carriers in collective proton transport in hydrogen-bonded chains [DE92-000306] N92-12649
PROTOSTARS
A three-dimensional model for molecular cloud collapse and protostellar formation N92-12898
PROTOTYPES
Full surface testing of grazing incidence mirrors [AD-A240356] N92-12676
PROVING
Authentication of byte sequences [DE92-000150] N92-12492
PSYCHOLOGICAL FACTORS
Ejection systems and the human factor: A guide for flight surgeons and aeromedical trainers [DCIEM-88-TR-16] N92-11986
PSYCHOLOGICAL TESTS
Use of a standardized test battery for the evaluation of psychomotor performances [CERMA-90-44(LCBA)] N92-12414
PSYCHOMOTOR PERFORMANCE
Use of a standardized test battery for the evaluation of psychomotor performances [CERMA-90-44(LCBA)] N92-12414
PUBLIC HEALTH
Global climate change and human health: Information needs, research priorities, and strategic considerations [DE90-012599] N92-12342
When is a dose not a dose? [DE92-000132] N92-12409
History of the determination of radium in man since 1915 [DE92-000355] N92-12410
PULSAR MAGNETOSPHERES
The spin down of the radio pulsars: Braking index N92-12936
On the nature of pulsar radiation N92-12956
PULSARS
Refractive interstellar scintillation effects in pulsar observations N92-12791
On the evolution of pulsars N92-12935
The spin down of the radio pulsars: Braking index N92-12936

The cyclotron absorption line and eclipse transition phenomena of 4U 1538-52 N92-12944
On two-dimensional relativistic stellar winds N92-12947
Observations of x ray pulsars from the Kvant module N92-12949
Generation of ultrahigh-energy gamma rays in accreting x ray pulsars N92-12950
On the nature of pulsar radiation N92-12956
The PSR 2127+12 as an indicator of a massive black hole in the core of globular cluster M 15 N92-12964
Basic physics and cosmology from pulsar timing data N92-12971

PULSE AMPLITUDE
A repetitive, one microsecond, thirty-five kilojoule, two hundred kilovolt pulse generator
[DE90-013063] N92-12167

PULSE AMPLITUDE MODULATION
Optimality conditions for minimax tasks: An application example from communications engineering
[ETN-91-90169] N92-12156

PULSE CODE MODULATION
A PC-based telemetry system for acquiring and reducing data from multiple PCM streams
[DE91-002199] N92-12037
Study of advanced techniques in modulation and coding for digital beam frequencies with large spectral effectiveness
[TELECOM-PARIS-90-E-020] N92-12152

PULSE COMPRESSION
The repetitive high energy pulsed power module
[DE90-013076] N92-12164

PULSE DURATION
Planar laser imaging of sprays for liquid rocket studies N92-12051
A repetitive, one microsecond, thirty-five kilojoule, two hundred kilovolt pulse generator
[DE90-013063] N92-12167
A Linear Variable Differential Transfer (LVDT) conditioner for the bundle profile monitor of AmPS
[DIGEL-1991-1] N92-12178
Optimization on AmPS chicane magnets
[NIKHEF-K-AMPS/91-02] N92-12595
Observations of x ray pulsars from the Kvant module N92-12949

PULSE GENERATORS
The repetitive high energy pulsed power module
[DE90-013076] N92-12164
A repetitive, one microsecond, thirty-five kilojoule, two hundred kilovolt pulse generator
[DE90-013063] N92-12167
Dielectric-liquid pulsed power switch
[DE90-009425] N92-12168
Tests on photoconductive semiconductor switches for subnanosecond risetime, multimegavolt pulser applications
[DE91-018797] N92-12190
A laser-produced lithium ion source for pulsed-power inertial confinement fusion
[DE90-013401] N92-12702

PULSE HEATING
Fabrication and assembly of BOLVAPS (boil-off lithium vapor source) ceramic-option half anodes
[DE90-012012] N92-12661

PULSE MODULATION
Optimization on AmPS chicane magnets
[NIKHEF-K-AMPS/91-02] N92-12595

PULSE REPETITION RATE
Examination of sampling control systems for inverters of limited pulse repetition
[ETN-91-90159] N92-12181

PULSED LASERS
MTX (Microwave Tokamak Experiment) diagnostics and timing system for FEL (Free Electron Laser) heating experiments
[DE90-013067] N92-12695
Effects of ambient background gases on YBCO plume propagation under film growth conditions: Spectroscopic, ion probe, and fast photographic studies
[DE92-000431] N92-12737

PULSED RADIATION
Design of a long isotropic buffer rod
[NRC-28903] N92-12290

PULSES
Position and velocity measuring system
[AD-D014975] N92-12232

PUMPS
Ultrasonic applications for space-based life support systems N92-12415

PYROELECTRICITY
Pyroelectric detectors processed on polyvinylidene fluoride and on copolymer, integrated on silicon substrate: Technological approach of infrared unit sensors and matrix arrays
[LAAS-91134] N92-12236

PYROMETERS
Error analysis of a ratio pyrometer by numerical simulation
[DE90-011500] N92-12229
Error analysis by numerical simulation for a three-color pyrometer assuming a blackbody spectrum and a wavelength and temperature dependent emissivity
[DE90-011504] N92-12230

PYROTECHNICS
A semi-analytical model for pressure-time history of granular pyrotechnic materials in a closed system
[DE90-012761] N92-12135
Compaction of TiH(1.65)/KClO4 pyrotechnic powder during confined burn
[DE90-013199] N92-12136

Q

QUADRUPOLES
Measurement of charge exchange reaction constants both at equilibrium and out of equilibrium in a Paul trap
[ETN-91-90103] N92-12361
Theory of exotic superconducting and normal states of heavy electron and high-T(sub c) materials
[DE90-012688] N92-12745

QUALITATIVE ANALYSIS
Physicochemical characterization of high-performance fibre-reinforced organic-matrix composites. Part 6: Methods for quality control of matrix chemistry
[NRC-28667-PT-6] N92-12061

QUALITY CONTROL
Design, manufacture, and calibration of Foucault current sensors
[DCR/M-51739/F-90] N92-12235

QUANTITATIVE ANALYSIS
Physicochemical characterization of high-performance fibre-reinforced organic-matrix composites. Part 6: Methods for quality control of matrix chemistry
[NRC-28667-PT-6] N92-12061
Chemically modified polymeric resins for high performance liquid chromatography, solid-phase extraction, and organic separation by LC and GC
[DE91-018166] N92-12130
Single-column ion chromatography of passive monitors for atmospheric pollution
[NRC-28893] N92-12352
The composition of meteoroids impacting LDEF N92-12910

QUANTUM CHROMODYNAMICS
Research in elementary particle physics
[DE90-013443] N92-12604
Jet rates from deep inelastic muon scattering in the W range of 15 to 35 GeV
[DE92-000470] N92-12651
Monte Carlo approaches to effective field theories
[DE92-000198] N92-12771

QUANTUM ELECTRODYNAMICS
Topics in gauge theories and the unification of elementary particle interactions
[DE90-013435] N92-12603

QUANTUM MECHANICS
From knots to quantum groups (and back)
[DE90-013688] N92-12591
Consistent multiparameter quantisation of GL(n)
[DE90-013689] N92-12592
Decay of spin-polarized atomic hydrogen in the presence of a Bose condensate N92-12624
Physical interpretation of supercoherent states and their associated Grassmann numbers
[DE92-000187] N92-12770
Monte Carlo approaches to effective field theories
[DE92-000198] N92-12771

QUANTUM NUMBERS
The riddle of high-energy baryon number violation
[DE92-000253] N92-12644

QUANTUM STATISTICS
Few-body collisions in a weakly interacting Bose gas
[ETN-91-90307] N92-12621

QUANTUM THEORY
Consistency conditions and representations of a q-deformed Virasoro algebra
[DE90-013715] N92-12359
Three-dimensional quantum calculations on the ground and excited state vibrations of ethylene N92-12632
Full-wave calculation of fast-wave current drive in tokamaks including k(sub (parallel)) upshifts
[DE92-000048] N92-12726
Can a man-made universe be achieved by quantum tunneling without an initial singularity? N92-12951

QUARK MODELS
A Monte Carlo study of the light (q sup 2)(bar q sup 2) system
[DE92-000449] N92-12580

QUARKS
Topics in gauge theories and the unification of elementary particle interactions
[DE90-013435] N92-12603

QUASARS
X-ray observations of SS 433 and the QSO MR 2251-178 N92-12789
Photoionization of intergalactic gas and cooling flows in clusters of galaxies N92-12896
High-Energy Astrophysics. American and Soviet Perspectives
[NASA-CR-186558] N92-12933
Gravitational lenses: The current sample, recent results, and continuing searches N92-12953
X ray emission from active galactic nuclei N92-12962
Extragalactic x ray source counts N92-12967
Ultraluminous infrared galaxies N92-12968

QUENCHING (COOLING)
Modifications to the rapid melt/rapid quench and transparent polymer video furnaces for the KC-135
[NASA-CR-184215] N92-12231

QUEUEING THEORY
Analysis and optimization of polling systems
[CWI-BS-R9102] N92-12548

R

RADAR
Ground-based millimeter wave Cloud Profiling Radar System (CPRS)
[DE91-018373] N92-12159
Using AITEST to troubleshoot a Radar Modulator (RM) unit: A case study in the application of expert systems to intermediate-level testing N92-12537

RADAR ASTRONOMY
Goldstone solar system radar N92-12824
Radar investigation of asteroids and planetary satellites N92-12837
Radar studies in the solar system N92-12843
Palomar Planet-Crossing Asteroid Survey (PCAS) January 1990 - February 1991 N92-12869
Goldstone solar system radar N92-12873
Asteroid 1986 DA: Radar evidence for a metallic composition N92-12882
Io's radar properties N92-12883
Radar studies in the solar system N92-12886

RADAR CROSS SECTIONS
VIERS-1, part 2: Completion of the laboratory experiments
[BCRS-90-27] N92-12378

RADAR DATA
The radon transform for data reduction, line detection, and artificial neural network preprocessing
[DE90-013521] N92-12516
Radar studies in the solar system N92-12886
Minor planet 1566 Icarus: Asteroid or comet? N92-12895

RADAR DETECTION
Future ESM systems and the potential for neural processing N92-12526

RADAR ECHOES
Palomar Planet-Crossing Asteroid Survey (PCAS) January 1990 - February 1991 N92-12869
Io's radar properties N92-12883

RADAR IMAGERY
SAR imaging of vortex ship wakes. Volume 3: An overview of pre-ERS-1 observations and models
[FFI-91/7007-VOL-3] N92-12157
The radon transform for data reduction, line detection, and artificial neural network preprocessing
[DE90-013521] N92-12516

RADAR MAPS
Arecibo S-band radar program N92-12803

RADAR RECEIVERS
Goldstone solar system radar N92-12824

RADAR REFLECTORS
Arecibo S-band radar program N92-12803

RADAR SCATTERING
Microwave remote sensing and radar polarization signatures of natural fields
[NASA-CR-189249] N92-12317
VIERS-1, part 2: Completion of the laboratory experiments
[BCRS-90-27] N92-12378
The wind profile in a wave flume N92-12380

RADAR SIGNATURES
Microwave remote sensing and radar polarization signatures of natural fields
[NASA-CR-189249] N92-12317
Radar investigation of asteroids and planetary satellites N92-12837

RADAR TRACKING
Reasoning with uncertain and incomplete information in aerospace applications N92-12544

Asteroid 1986 DA: Radar evidence for a metallic composition N92-12882
Io's radar properties N92-12883
Radar studies in the solar system N92-12886

RADAR TRANSMITTERS
Goldstone solar system radar N92-12824

RADIAL VELOCITY
Radial velocity detection of extra-solar planetary systems N92-12806
The radial velocity search for extrasolar planets N92-12832
The peculiar velocity field predicted from the distribution of IRAS galaxies N92-12969

RADIATION ABSORPTION
Neutron interactions and contrast production in neutron radiography
[DE91-019064] N92-12294

RADIATION COUNTERS
Large Hadron Collider Workshop. Volume 2: Proceedings
[DE91-634595] N92-12663

RADIATION DAMAGE
Designing equipment for use in gamma radiation environments
[DE90-012050] N92-12162
Neutron flux enhancement at LASREF
[DE92-000196] N92-12640

RADIATION DETECTORS
D0 data acquisition: High speed data paths for D0
[DE90-013326] N92-12444
Tracking and vertex finding with drift chambers and neural networks
[DE92-000472] N92-12652
Research program in experimental high energy physics, task B
[DE90-013323] N92-12660
Soft x-ray measurement of internal tearing mode structure in a reversed-field pinch
[DE92-000164] N92-12729
The GAMMASPHERE
[DE92-000448] N92-12986

RADIATION DOSAGE
Uncertainty analysis report for Ulysses, volume 1
[DE91-013476] N92-12039
Laser spectroscopy: Assessment of research needs for laser technologies applied to advanced spectroscopic methods
[DE90-011788] N92-12244
When is a dose not a dose?
[DE92-000132] N92-12409
High energy SEU test results for the commercially available MIPS R3000 microprocessor and R3010 floating point unit
[DE91-019019] N92-12441
The total defence radiation protection organization. A study of its capability
[FOA-C-40285-4.3] N92-12773
The estimation of the dose from cosmic radiation received by the population living at mainland of China
[DE91-631668] N92-12985

RADIATION EFFECTS
Electron beam irradiation of polymer blends
[ETN-91-90139] N92-12122
Characterization and development report for the 381558
[DE90-010395] N92-12161
Designing equipment for use in gamma radiation environments
[DE90-012050] N92-12162
Chemical release and radiation effects experiment advanced planned
[NASA-CR-184229] N92-12360
Combined Release and Radiation Effects Satellite (CRRES) Experiment: Educational planning and coordination
[NASA-CR-184255] N92-12362
When is a dose not a dose?
[DE92-000132] N92-12409
Nuclear Medicine Program
[DE92-000383] N92-12411
High energy SEU test results for the commercially available MIPS R3000 microprocessor and R3010 floating point unit
[DE91-019019] N92-12441
Neutron flux enhancement at LASREF
[DE92-000196] N92-12640
Effects of oxide layers on optical properties and x ray hardness of Al-Be mirrors
[DE92-000476] N92-12687
Magnetization studies of irradiation modified single crystal Y1Ba2Cu3O7 superconductors: Flux creep and annealing effects
[DE91-018858] N92-12758

RADIATION HARDENING
Characterization and development report for the 381558
[DE90-010395] N92-12161
Integrated, non-volatile, high-speed analog random access memory
[NASA-CASE-NPO-17998-1-CU] N92-12438
High energy SEU test results for the commercially available MIPS R3000 microprocessor and R3010 floating point unit
[DE91-019019] N92-12441
Effects of oxide layers on optical properties and x ray hardness of Al-Be mirrors
[DE92-000476] N92-12687

RADIATION HAZARDS
Laser spectroscopy: Assessment of research needs for laser technologies applied to advanced spectroscopic methods
[DE90-011788] N92-12244
The total defence radiation protection organization. A study of its capability
[FOA-C-40285-4.3] N92-12773

RADIATION MEASUREMENT
Climate Monitoring and Diagnostics Laboratory no. 18
[PB91-205559] N92-12371
A high-efficiency neutron coincidence counter for small samples
[DE92-000183] N92-12639

RADIATION PROTECTION
The total defence radiation protection organization. A study of its capability
[FOA-C-40285-4.3] N92-12773

RADIATION SOURCES
Safety Evaluation Report for Ulysses, volume 2
[DE91-013475] N92-12040
Method and apparatus for producing a photopumped VUV laser in Mo(6+) ion-containing plasma
[AD-D014961] N92-12250

RADIATION SPECTRA
Error analysis by numerical simulation for a three-color pyrometer assuming a blackbody spectrum and a wavelength and temperature dependent emissivity
[DE90-011504] N92-12230
X ray radiation from Supernova 1987A. The results of the Kvant module in 1987-1989 N92-12970

RADIATION THERAPY
Nuclear Medicine Program
[DE92-000383] N92-12411

RADIATION TRANSPORT
Thermal generation and mobility of charge carriers in collective proton transport in hydrogen-bonded chains
[DE92-000306] N92-12649
The shock breakout in SN1987A modelled with the time-dependent radiative transfer N92-12939

RADIATION TRAPPING
Cooling of ions trapped in potential wells produced by electromagnetic radiation fields
[DE91-631104] N92-12635

RADIATIVE HEAT TRANSFER
The variable polarity plasma arc welding process: Characteristics and performance
[NASA-CR-184259] N92-12279
Physical conditions and heating/cooling processes in high mass star formation regions
[MPE-PREPRINT-200] N92-12974

RADIATIVE TRANSFER
Numerical studies of the role of clouds in the present climate
[DE90-014345] N92-12370
Radiative transfer in planetary atmospheres N92-12842
Radiative transfer in planetary atmospheres: Submillimeter-wave spectroscopy of comets N92-12885
The shock breakout in SN1987A modelled with the time-dependent radiative transfer N92-12939
A study of the temporal behavior of the vertical structure of Jupiter's atmosphere N92-12976

RADICALS
Laser studies of the photodissociation dynamics of cometary radicals N92-12823

RADII
The year 1990 marks end of Pluto-Charon mutual event season N92-12889

RADIO ASTRONOMY
Refractive interstellar scintillation effects in pulsar observations N92-12791
Radar investigation of asteroids and planetary satellites N92-12837
Observations of formaldehyde and search for cyanoacetylene in Comet Brorsen-Metcalf (1988o) N92-12887
MERLIN observations of 4C29.6 (3C59) and 4C35.37: Two radio structures misidentified with Seyfert galaxies
[MPE-PREPRINT-204] N92-12984

RADIO ECHOES
Goldstone solar system radar N92-12873

RADIO EMISSION
Axially symmetrical supernova remnants N92-12937
Radio telescopes as the detectors of super-high-energy neutrinos N92-12945

RADIO FREQUENCIES
Workshop on Artificially Ionized Layers in the Atmosphere
[DE90-013470] N92-12358
Developments and directions in 200 MHz very high power RF at LAMPF
[DE92-000175] N92-12667
The Ion Cyclotron Heating (ICH) system for BPX
[DE92-000426] N92-12736

RADIO FREQUENCY HEATING
Inductive currents in an RF driven plasma
[DE92-000491] N92-12738

RADIO INTERFEROMETERS
Radar interferometric studies of comets N92-12845

RADIO SIGNALS
Radio telescopes as the detectors of super-high-energy neutrinos N92-12945

RADIO SOURCES (ASTRONOMY)
MERLIN observations of 4C29.6 (3C59) and 4C35.37: Two radio structures misidentified with Seyfert galaxies
[MPE-PREPRINT-204] N92-12984

RADIO SPECTRA
Io's radar properties N92-12883

RADIO SPECTROSCOPY
Radiative transfer in planetary atmospheres N92-12842

RADIO TELESCOPES
Radio telescopes as the detectors of super-high-energy neutrinos N92-12945

RADIOACTIVE DECAY
A search for the coherent production of axions in the milli eV range
[DE92-000439] N92-12650

RADIOACTIVE ISOTOPES
Quick separation and determination of Pm-147 in water by HDEHP-KeL-F chromatography
[DE91-628873] N92-12094
Nuclear Medicine Program
[DE92-000383] N92-12411

RADIOACTIVE MATERIALS
Update of Ulysses FSAR results using updated NASA probabilities
[DE90-012504] N92-12008
Safety Evaluation Report for Ulysses, volume 1
[DE91-013473] N92-12047

RADIOBIOLOGY
Biological dosimetry: A review of methods available for determination of ionizing radiation dose
[FOA-C-40282-4.3] N92-12400
When is a dose not a dose?
[DE92-000132] N92-12409
Nuclear Medicine Program
[DE92-000383] N92-12411

RADIOISOTOPE BATTERIES
Safety Evaluation Report for Ulysses, volume 2
[DE91-013475] N92-12040
Nuclear power engineering in space
[DE90-012743] N92-12656
Thulium heat source for high-endurance and high-energy density power systems
[DE91-018991] N92-12666

RADIOMETERS
Interpreting measurements obtained with the cloud absorption radiometer
[NASA-CR-189241] N92-12366
Visible and infrared investigations of planet-crossing asteroids and outer solar system objects N92-12851

RADIOMETRIC RESOLUTION
MERIS data compression: A presentation of the current status of the study
[REPT-911-440-113] N92-12322

RADIUM
History of the determination of radium in man since 1915
[DE92-000355] N92-12410

RADON
The radon transform for data reduction, line detection, and artificial neural network preprocessing
[DE90-013521] N92-12516

RAIN
Summary of 1991 Atlantic tropical cyclone activity and seasonal forecast verification: A year of no hurricanes in the tropics but an unusually large number of higher latitude baroclinically influenced tropical cyclone systems N92-12376
Extended range forecast of Atlantic seasonal hurricane activity for 1992 N92-12377

RAMAN SPECTRA
Stimulated Raman scattering in optical fibers: Polychromatic single-field numerical experiments
[DE90-012894] N92-12671
RAMAN SPECTROSCOPY
CARS temperature measurements in a hypersonic propulsion test facility N92-12049
The calculation of theoretical coherent anti-Stokes Raman spectra
[NRC-29810] N92-12085
Superconducting La2CuO(4+x) prepared by oxygenation at high pressure: A Raman scattering study
[DE90-012915] N92-12747
RAMJET ENGINES
The design and performance estimates for the propulsion module for the booster of a TSTO vehicle
[NASA-TM-105299] N92-11995
RANDOM ACCESS MEMORY
Integrated, non-volatile, high-speed analog random access memory
[NASA-CASE-NPO-17998-1-CU] N92-12438
RANDOM ERRORS
Random uncertainties in the surface spectroscopies
[NPL-DMM(A)-26] N92-12087
RANDOM WALK
A Monte Carlo study of the light (q sup 2)(bar q sup 2) system
[DE92-000449] N92-12580
RANGE FINDERS
Segmentation of complex geometric forms by the curvature method
[NRC-31210] N92-12475
Algebraic error analysis for surface curvatures of 3-D range images
[NRC-30297] N92-12559
RANGEFINDING
Sensory processing and world modeling for an active ranging device
[NASA-CR-188915] N92-12319
RANKINE CYCLE
Electricity from waste heat
[DE91-527080] N92-12331
RARE EARTH ELEMENTS
A simple model for localized-itinerant magnetic systems: Crystal field effects
[DE90-625399] N92-12746
RARE GAS-HALIDE LASERS
Laserable KrF(*)-excimer discharge with integrated preionization
[ETN-91-90177] N92-12253
RARE GASES
A scintillation detector for measuring inert gas beta rays
[DE91-630700] N92-12634
RATES (PER TIME)
Single-column ion chromatography of passive monitors for atmospheric pollution
[NRC-28893] N92-12352
RAY TRACING
Development of advanced flow simulation system by water flow model
[DE90-503438] N92-12197
Full-wave calculation of fast-wave current drive in tokamaks including k(sub (parallel)) upshifts
[DE92-000048] N92-12726
RAYLEIGH WAVES
Comparison of some different formulae for ground shock prediction
[FFI-90/4006] N92-12363
REACTING FLOW
CARS temperature measurements in a hypersonic propulsion test facility N92-12049
TURCOM: A computer code for the calculation of transient, multi-dimensional, turbulent, multi-component chemically reactive fluid flows. Part 2: Compressible and combusting flow
[NRC-29287-PT-2] N92-12214
REACTION KINETICS
Current issues in sol-gel reaction kinetics
[DE90-012226] N92-12074
Hydrogen isotopic exchange over palladium metal
[DE90-012063] N92-12076
Probe molecule studies: Active species in alcohol synthesis
[DE92-000332] N92-12138
Transformation and deposition of atmospheric nitrogen species: A view from the aqueous side
[DE90-013737] N92-12348
Recent (e,2e) studies: Laser excited atoms, autoionization, Auger processes, and thin films
[DE91-634156] N92-12614
REACTOR DESIGN
COMMIX-1AR/P: A three-dimensional transient single-phase computer program for thermal hydraulic analysis of single and multicomponent systems
[DE91-018703] N92-12222
An analysis of grazing incidence metal mirrors in a laser ICF reactor driver
[DE92-000093] N92-12710
The TITAN reversed-field-pinch fusion reactor study, volume 3
[DE92-000139] N92-12727
Electromagnetic loads on ITER in-vessel components
[DE92-000672] N92-12739
REACTOR MATERIALS
Spatial variability in the tensile strength of an extruded nuclear-grade graphite
[DE91-018868] N92-12070
Neutron flux enhancement at LASREF
[DE92-000196] N92-12640
Recent progress in the development of materials for fusion reactors
[DE91-016283] N92-12722
A system to deposit boron films (boronization) in the D3-D tokamak
[DE92-000288] N92-12733
REACTOR SAFETY
Heat transfer between stratified liquids with bubbling across the interface
[DE90-008579] N92-12192
Multimegawatt space power reactors
[DE90-012965] N92-12657
Total magnetic reconnection during a tokamak major disruption
[DE90-014711] N92-12706
The TITAN reversed-field-pinch fusion reactor study, volume 3
[DE92-000139] N92-12727
REACTOR TECHNOLOGY
Multimegawatt space power reactors
[DE90-012965] N92-12657
Recent progress in the development of materials for fusion reactors
[DE91-016283] N92-12722
The TITAN reversed-field-pinch fusion reactor study, volume 3
[DE92-000139] N92-12727
READ-ONLY MEMORY DEVICES
Some simple bounds for approximations of sigmoidal functions in layered neural nets
[REPT-90-022] N92-12511
REAL TIME OPERATION
B-2 and other current flight test control center system architectures N92-12011
Space shuttle Mission Control Center upgrade N92-12015
Real Time Data System (RTDS) N92-12019
SHARP: Spacecraft Health Automated Reasoning Prototype N92-12020
Automation for deep space vehicle monitoring N92-12022
Real Time Data System (RTDS) N92-12025
Ames life science telescience testbed evaluation
[NASA-CR-188856] N92-12033
Autonomous trajectory generation for mobile robots with non-holonomic and steering angle constraints
[DE90-012298] N92-12268
Software for Guidance and Control
[AGARD-CP-503] N92-12449
Coprocessor support for real-time Ada N92-12454
The data oriented requirements implementation scheme N92-12460
Process/object-oriented Ada software design for an experimental helicopter N92-12461
Code generation for fast DSP-based real-time control N92-12462
Common Ada Missile Packages (CAMP) N92-12468
Interactive digital image display and analysis system (IDIDAS) user's guide
[NOAA-TR-NESDIS-59] N92-12470
A NASA/RAE cooperation in the development of a real-time knowledge based autopilot N92-12528
Development of tactical decision aids N92-12532
AI for RPVs, Sensor Driven Airborne Replanner (SDAR), for a Robotic Aircraft Sensor Platform (RASP) N92-12534
Engineering Graphical Analysis Tool (EGAT) development program N92-12542
A distributed agent architecture for real-time knowledge-based systems: Real-time expert systems project, phase 1
[NASA-CR-188947] N92-12781
An overview of realtime expert systems
[NRC-31759] N92-12783
REAL VARIABLES
The state variable method as a unifying approach to the study of semiconductor devices
[REPT-90-045] N92-12187
RECEIVERS
Precise relative sea surface positioning of a floating platform using the Global Positioning System (GPS) N92-11987
RECIPROCITY THEOREM
Reciprocity theory of many-body interactions
[IC-AERO-90-01] N92-12620
RECIRCULATIVE FLUID FLOW
Flow visualization and flow field measurements of a 1/12 scale tilt rotor aircraft in hover
[NASA-CR-189456] N92-11983
RECOMBINATION COEFFICIENT
Spin-polarized atomic hydrogen in very strong magnetic fields N92-12626
Resonances in recombination of atomic hydrogen due to long-range H3 molecular states N92-12627
RECOMBINATION REACTIONS
Interpretation of ion energy spectra of laser plasmas, by recombination model
[ETN-91-90170] N92-12713
RECYCLING
Recent trends in waste-reduction efforts in the US manufacturing sector
[DE92-000197] N92-12357
RED SHIFT
Gravitational lenses: The current sample, recent results, and continuing searches N92-12953
Extragalactic x ray source counts N92-12967
The peculiar velocity field predicted from the distribution of IRAS galaxies N92-12969
REDUCED GRAVITY
Materials processing in low gravity
[NASA-CR-184213] N92-12139
Incipient boiling in microgravity N92-12140
Protein crystal growth in low gravity
[NASA-CR-188974] N92-12141
Flight Research Laboratory T-33 microgravity facility flight operations, 1986 to 1990
[NRC-32136] N92-12142
Optical studies in the holographic ground station
[NASA-CR-184257] N92-12239
Ultrasonic applications for space-based life support systems N92-12415
Microgravity science requirements and the need for data compression N92-12430
REDUNDANCY
An independent review of the Multi-Path Redundant Avionics Suite (MPRAS) architecture assessment and characterization report
[NASA-CR-188126] N92-12440
Formal verification of a redundancy management algorithm N92-12457
REDUNDANCY ENCODING
Authentication of byte sequences
[DE92-000150] N92-12492
REFLECTANCE
Effects of oxide layers on optical properties and x ray hardness of Al-Be mirrors
[DE92-000476] N92-12687
Long term changes in reflectivity and large scale motions in the atmosphere of Jupiter and Saturn N92-12795
Infrared observations of small solar system bodies N92-12802
REFLECTED WAVES
The wind profile in a wave flume N92-12380
REFLECTOMETERS
Linearisation of diode detectors for use in a multistate reflectometer
[NPL-DES-104] N92-12241
Reflectometry and transport in thermonuclear plasmas in the joint European Torus
[ETN-91-90135] N92-12709
REFRACTED WAVES
Over forty years of continuous research at UTIAS on nonstationary flows and shock waves
[UTIAS-50] N92-11974
REFRACTING TELESCOPES
Allegheny Observatory search for planetary systems N92-12812
REFRACTION
Refractive interstellar scintillation effects in pulsar observations N92-12791
REFRIGERANTS
Thermal conductivity of gaseous halogenated hydrocarbons
[ESDU-91005] N92-12080
RELATIVISTIC ELECTRON BEAMS
Three-dimensional particle-in-cell modeling of relativistic electron beam production and transport for KrF laser pumping
[DE90-013050] N92-12247
RELATIVISTIC PLASMAS
On two-dimensional relativistic stellar winds N92-12947
RELATIVISTIC THEORY
Basic physics and cosmology from pulsar timing data N92-12971

RELAXATION (MECHANICS)
Strengthening of composites by internal stresses: Determination by neutron diffraction
[DE91-018549] N92-12756
The flux jumps in high Tc Bi(1.7)Pb(0.3)Sr2 Ca2Cu3O(y) bulk superconductor
[DE91-628641] N92-12760
RELAXATION METHOD (MATHEMATICS)
A two-grid analysis of the combination of mixed finite elements and Vanka-type relaxation
[CWI-NM-R9102] N92-12566
Parallel solution of the Burgers equation
[CWI-NM-R9104] N92-12568
RELEASING
Chemical release and radiation effects experiment advanced planned
[NASA-CR-184229] N92-12360
RELIABILITY
NASA reliability preferred practices for design and test
[NASA-TM-4322] N92-12286
RELIABILITY ANALYSIS
Constraint propagation through electromagnetic interaction topologies
[NRC-31761] N92-12154
A general software reliability process simulation technique
[NASA-CR-189037] N92-12482
RELIABILITY ENGINEERING
Life testing and reliability with application in engineering systems
[AD-A240042] N92-12287
System-based component test problem: The design of optimum system based component test plans N92-12587
REMOTE CONTROL
Ames life science telescience testbed evaluation
[NASA-CR-188856] N92-12033
REMOTE SENSING
Microwave remote sensing and radar polarization signatures of natural fields
[NASA-CR-189249] N92-12317
Report of a workshop on using remote sensing to estimate land use change
[DE90-011278] N92-12318
Estimation of surface heat and moisture fluxes over a prairie grassland using a hybrid biosphere/remote sensing model N92-12320
The sensitivity of synthetic aperture radiometers for remote sensing applications from space
[NASA-TM-100741] N92-12321
Geologic mapping of tunnels using photogrammetry-control-point configuration
[DE91-019071] N92-12323
VIERS-1, part 2: Completion of the laboratory experiments
[BCRS-90-27] N92-12378
The wind profile in a wave flume N92-12380
REPLACING
Environmental projects. Volume 13: Underground storage tanks, removal and replacement. Goldstone Deep Space Communications Complex
[NASA-CR-189030] N92-12035
REQUIREMENTS
Research needs for improvement of protection against explosive or toxic industrial chemicals hazards
[FOA-C-40286-4.5] N92-12147
RESEARCH AND DEVELOPMENT
Over forty years of continuous research at UTIAS on nonstationary flows and shock waves
[UTIAS-50] N92-11974
Basic energy sciences: Summary of accomplishments
[DE90-011269] N92-12327
Concluding remarks: Promises and limitations of individual cell and particle analysis
[DE91-016900] N92-12381
Bibliography of Lewis Research Center technical publications announced in 1990
[NASA-TM-103753] N92-12786
RESEARCH FACILITIES
Flight Research Laboratory T-33 microgravity facility flight operations, 1986 to 1990
[NRC-32136] N92-12142
RESEARCH MANAGEMENT
Future applications of artificial intelligence to Mission Control Centers N92-12032
An independent review of the Multi-Path Redundant Avionics Suite (MPRAS) architecture assessment and characterization report
[NASA-CR-188126] N92-12440
Magnetohydrodynamic projects at the CDIF
[DE92-000396] N92-12735
Planetary astronomy N92-12844
RESEARCH PROJECTS
Future applications of artificial intelligence to Mission Control Centers N92-12032
Flight Research Laboratory T-33 microgravity facility flight operations, 1986 to 1990
[NRC-32136] N92-12142
A research program in experimental high energy physics
[DE90-013321] N92-12659
Research program in experimental high energy physics, task B
[DE90-013323] N92-12660
Georgian space research program N92-12955
RESIDENTIAL ENERGY
Hardware development and initial subassembly test of a gas-fired Stirling/Rankine residential heat pump
[DE90-012203] N92-12194
RESIDUAL STRESS
Influences of expanding monomer on carbon fiber reinforced epoxy composites 2
[AD-A240583] N92-12057
Failure analysis of turbine blades
[DE91-631513] N92-12282
Strengthening of composites by internal stresses: Determination by neutron diffraction
[DE91-018549] N92-12756
RESIDUES
The composition of meteoroids impacting LDEF N92-12910
RESINS
Chemically modified polymeric resins for high performance liquid chromatography, solid-phase extraction, and organic separation by LC and GC
[DE91-018166] N92-12130
RESONANCE
Resonance ionization mass spectrometry for materials analysis and characterization
[DE90-013187] N92-12077
Examination of excitation and decay of giant resonances in Ca-40 by (e,e'x) coincidence experiments
[ETN-91-90174] N92-12617
Nonlinear resonant absorption and wave breaking (Vlasov simulation of resonance excited plasma waves)
[ETN-91-90172] N92-12714
RESONANCE FLUORESCENCE
Trapping of neutral atoms with resonant microwave radiation N92-12623
RESONANCE SCATTERING
Nonsingular integral equation for two-body scattering and applications in two and three dimensions N92-12625
RESONANCE TESTING
Resonance and control response tests using a control stimulation drive
[MBB-UD-0586-90-PUB] N92-12003
RESONANT FREQUENCIES
Determination of the effects of wind-induced vibration on cylindrical beams
[NASA-TM-103824] N92-12300
Method of recertifying a loaded bearing member
[NASA-CASE-LAR-14168-1] N92-12302
RESONATORS
Narrow-bandwidth diffraction-limited coupled stable-unstable resonator laser cavity
[AD-D014974] N92-12251
RESOURCES MANAGEMENT
Networking at NASA. Johnson Space Center N92-12498
RESPIRATORY IMPEDANCE
Evaluation of the physiological effects of an additional dead space involved in wearing an anti-smoke mask
[REPT-9/CEV/SE/LAMAS] N92-12420
RESPIRATORY PHYSIOLOGY
Evaluation of the physiological effects of an additional dead space involved in wearing an anti-smoke mask
[REPT-9/CEV/SE/LAMAS] N92-12420
RETROFITTING
Compendium of MHD-related terminology
[DE90-012867] N92-12699
RETROREFLECTORS
Toward the optimisation of passive ground targets in spaceborne laser ranging
[REPT-911-440-112] N92-12256
REVERSE FIELD PINCH
The TITAN reversed-field-pinch fusion reactor study, volume 3
[DE92-000139] N92-12727
Soft x-ray measurement of internal tearing mode structure in a reversed-field pinch
[DE92-000164] N92-12729
REVERSED FLOW
An experimental and computational investigation of an annular reverse-flow combustor
[UTIAS-338] N92-11996
REVERSING
Time-reversion of a hybrid state stochastic difference system
[NLT-TP-89014-U] N92-12585
REVISIONS
Improved KrF laser design for the Laboratory Microfusion Facility
[DE92-000171] N92-12259
RHEOLOGY
Electron beam irradiation of polymer blends
[ETN-91-90139] N92-12122
Advanced study in solid transport: Rheological behavior of dense suspension
[DE90-009025] N92-12196
RICCATI EQUATION
Difference and differential Riccati equations: A note on the convergence to the strong solution
[REPT-90-015] N92-12572
Differential periodic Riccati equations: A note on the existence of an infinite number of periodic strong solutions
[REPT-90-020] N92-12574
On the convergence to the strong solution of periodic Riccati equations
[REPT-90-021] N92-12575
RIGID STRUCTURES
Direct estimation of deformable motion parameters from a range image sequence
[NRC-31757] N92-12476
RING LASERS
Coherent communication link using diode-pumped lasers
[NASA-CR-189248] N92-12149
RING STRUCTURES
The stability of graphite brushes at high velocity
[ETN-91-90176] N92-12184
Nonlinear dynamics of optical ring resonators
[ETN-91-90173] N92-12680
RISK
Uncertainty analysis report for Ulysses, volume 1
[DE91-013476] N92-12039
Safety Evaluation Report for Ulysses, volume 1
[DE91-013473] N92-12047
Monitoring IACP samples and construction of a centralized database
[PB91-213546] N92-12351
When is a dose not a dose?
[DE92-000132] N92-12409
ROBOT ARMS
Integration of model-based and sensor-based control for a two-link flexible robot arm
[DE90-012183] N92-12266
Three-dimensional elastodynamic modeling and analysis of a flexible robot manipulator N92-12271
Heuristic methods for optimal trajectory planning of robotic manipulators N92-12272
ROBOT CONTROL
Integration of model-based and sensor-based control for a two-link flexible robot arm
[DE90-012183] N92-12266
A virtual sensor approach to robot kinematic identification: Theory and experimental implementation
[DE90-012186] N92-12267
Autonomous trajectory generation for mobile robots with non-holonomic and steering angle constraints
[DE90-012298] N92-12268
Planning and reasoning in the JPL telerobot testbed
[NASA-CR-189038] N92-12278
ROBOT DYNAMICS
A virtual sensor approach to robot kinematic identification: Theory and experimental implementation
[DE90-012186] N92-12267
Three-dimensional elastodynamic modeling and analysis of a flexible robot manipulator N92-12271
Planning and reasoning in the JPL telerobot testbed
[NASA-CR-189038] N92-12278
ROBOT SENSORS
A virtual sensor approach to robot kinematic identification: Theory and experimental implementation
[DE90-012186] N92-12267
ROBOTICS
Design and development of proprioceptive sensors to be used for mobile robot localization
[LAAS-91178] N92-12238
CAD/CAM activities at NRC: 1988
[NRC-29225] N92-12477
AI for RPVs, Sensor Driven Airborne Replanner (SDAR), for a Robotic Aircraft Sensor Platform (RASP) N92-12534
Supervisory autonomy in telerobotics
[NRC-31743] N92-12546
A bootstrapping approach to robot intelligence: First results
[REPT-90-068] N92-12552
ROBOTS
Bulletin of the Division of Electrical Engineering, 1987-1988, volume 3, number 2
[NRC-29078-VOL-3-NO-2] N92-12177

Monocular 3D vision for a robot assembly environment
[DE90-010824] N92-12264
Autonomous trajectory generation for mobile robots with non-holonomic and steering angle constraints
[DE90-012298] N92-12268
Planning and reasoning in the JPL telerobot testbed
[NASA-CR-189038] N92-12278
CAD/CAM activities at NRC: 1988
[NRC-29225] N92-12477
Supervisory autonomy in telerobotics
[NRC-31743] N92-12546

ROBUSTNESS (MATHEMATICS)
Constraint treatment techniques and parallel algorithms for multibody dynamic analysis N92-12297
Robustness of feedback stabilization: A topological approach
[ETN-91-90142] N92-12545

RODS
Design of a long isotropic buffer rod
[NRC-28903] N92-12290

ROTARY WING AIRCRAFT
Tracking performance requirements for rotorcraft instrument approaches to reduced minima. Phase 1: Preliminary study
[NRC-32137-PHASE-1] N92-11988

ROTATING BODIES
A three-dimensional model for molecular cloud collapse and protostellar formation N92-12898

ROTATING DISKS
Numerical verification of NISA 2 finite element analysis of the cracked 5th stage compressor disc of J-85 jet engine
[NRC-LTR-ST-1792] N92-11997

ROTATION
Heat transfer and instrumentation studies on rotating turbine blades in a transient facility N92-12203

ROTATIONAL SPECTRA
Laser studies of the photodissociation dynamics of cometary radicals N92-12823

ROTOR SPEED
Helicopter main-rotor speed effects: A comparison of predicted ranges of detection from the aural detection program ICHIN and the electronic detection program ARCAS
[NASA-TM-104134] N92-12598

ROTORS
On the limitations of Froude's actuator disc concept
[ETN-91-90136] N92-11973
Variable impedance journal bearings for rotor-bearing systems N92-12270

ROUTES
Performance analysis of LAN bridges and routers N92-12501
Heuristic route optimization: A model for force level route planning N92-12520

RUN TIME (COMPUTERS)
On the feasibility of numerical analysis of large creep problems N92-12298

RUNGE-KUTTA METHOD
Smoothed Runge-Kutta methods in the method of lines
[CWI-NM-R9101] N92-12565
Parallel diagonally implicit Runge-Kutta-Nystroem methods
[CWI-NM-R9103] N92-12567

RYDBERG SERIES
Semiclassical calculation of the vibrational structure of the (B) 1B(sub u) Rydberg state of trans-di-imide from ab initio CI potential energy surfaces N92-12629

S

S WAVES
Comparison of some different formulae for ground shock prediction
[FFI-90/4006] N92-12363

SAFETY
Update of Ulysses FSAR results using updated NASA probabilities
[DE90-012504] N92-12008
Safety Evaluation Report for Ulysses, volume 2
[DE91-013475] N92-12040
Safety Evaluation Report for Ulysses, volume 1
[DE91-013473] N92-12047
Bibliography for computer security, integrity, and safety
[NASA-CR-188950] N92-12439
Software methodologies for safety critical systems N92-12467

SALINITY
Ocean energy contract list, fiscal year 1990
[DE91-002177] N92-12333

SALTS
Measurements of heat and mass transfer coefficients during absorption of water vapor by lithium bromide and (Li,K,Na)NO3 mixtures
[DE91-014212] N92-12088

SAMARIUM ISOTOPES
Nd-142/Nd-144 in SNCs and early differentiation of a heterogeneous Martian mantle N92-12925

SAMPLING
Solving stochastic linear programs on a hypercube multicomputer
[AD-A240630] N92-12472

SAND CASTING
The acoustic emission characteristics of solidification and formation of casting defects in aluminum alloy 319 N92-12101

SANDS
A comparison of three methods for solving flow equations of two immiscible fluids in variably saturated media
[DE91-016945] N92-12220

SANDWICH STRUCTURES
Nondestructive testing of sandwich structures
[REPT-911-430-137] N92-12066

SATELLITE ATMOSPHERES
Studies of extended planetary atmospheres N92-12822
Outer planet studies N92-12829
Probing Titan's atmosphere with a stellar occultation N92-12871

SATELLITE COMMUNICATION
ECS: Seventh year in orbit
[ESA-BR-74] N92-12009

SATELLITE CONTROL
AFSCN command and control segment evolution N92-12017
Advanced Satellite Workstation (ASW) N92-12521

SATELLITE IMAGERY
Concluding remarks: Promises and limitations of individual cell and particle analysis
[DE91-016900] N92-12381
Interactive digital image display and analysis system (IDIDAS) user's guide
[NOAA-TR-NESDIS-59] N92-12470

SATELLITE OBSERVATION
SAR imaging of vortex ship wakes. Volume 3: An overview of pre-ERS-1 observations and models
[FFI-91/7007-VOL-3] N92-12157
Reports of planetary astronomy, 1991
[NASA-TM-4329] N92-12792
Nearby main sequence stars with cool circumstellar material N92-12904
Observing SN 1987A with the International Ultraviolet Explorer N92-12957

SATELLITE TRACKING
AFSCN command and control segment evolution N92-12017

SATELLITE-BORNE INSTRUMENTS
X ray radiation from Supernova 1987A. The results of the Kvant module in 1987-1989 N92-12970

SATELLITE-BORNE RADAR
Spacecraft electrical power system fault detection/diagnosis and resource management N92-12523

SATURABLE REACTORS
The repetitive high energy pulsed power module
[DE90-013076] N92-12164

SATURATION (CHEMISTRY)
A comparison of three methods for solving flow equations of two immiscible fluids in variably saturated media
[DE91-016945] N92-12220

SATURN (PLANET)
Storm on Saturn N92-12877

SATURN ATMOSPHERE
Long term changes in reflectivity and large scale motions in the atmosphere of Jupiter and Saturn N92-12795
Infrared variability of Jupiter and Saturn N92-12825
Storm on Saturn N92-12877

SATURN RINGS
Stellar occultations by planetary rings: 3 July 1989 28 SGR occultation by Saturn N92-12838

SATURN SATELLITES
Radar investigation of asteroids and planetary satellites N92-12837

SAWTOOTH WAVEFORMS
Studies of fine structure of discharge region on HT-6B tokamak device
[DE91-628421] N92-12723

SCALARS
A search for the coherent production of axions in the milli eV range
[DE92-000439] N92-12650

SCALE (CORROSION)
Particle measurement and brine chemistry at the Salton Sea Deep Well
[DE92-000031] N92-12337

SCALE MODELS
Control aspects of the transition from transversal to transonic flow, step effects
[ETN-91-90106] N92-11981

SCANNERS
A novel scanning interferometer for two-dimensional plasma density measurements
[DE90-625514] N92-12697
Discovery of near-Earth asteroids by CCD scanning N92-12868

SCATTERING AMPLITUDE
Measurement of rho, the ratio of the real to imaginary part of the (-p)p forward elastic scattering amplitude, at (radical)s = 1.8 TeV
[DE92-000155] N92-12637

SCATTERING CROSS SECTIONS
Constraints placed on the Higgs sector from precision electroweak measurements
[DE92-000236] N92-12643

SCHEDULING
Interactive Office user's manual
[NASA-CR-184203] N92-12447
Process/object-oriented Ada software design for an experimental helicopter N92-12461
Solar array management guide
[REPT-911-440-114] N92-12778

SCHOTTKY DIODES
Infrared image detector utilizing Schottky barrier junctions
[AD-D014976] N92-12677

SCHROEDINGER EQUATION
Solving the discretized time-independent Schroedinger equation in the Lanczos procedure N92-12630

SCIENTIFIC SATELLITES
Chemical release and radiation effects experiment advanced planned
[NASA-CR-184229] N92-12360
Combined Release and Radiation Effects Satellite (CRRES) Experiment: Educational planning and coordination
[NASA-CR-184255] N92-12362

SCINTILLATION
A scintillation detector for measuring inert gas beta rays
[DE91-630700] N92-12634
Refractive interstellar scintillation effects in pulsar observations N92-12791
Probing Titan's atmosphere with a stellar occultation N92-12871

SCINTILLATION COUNTERS
Quick separation and determination of Pm-147 in water by HDEHP-KeL-F chromatography
[DE91-628873] N92-12094
History of the determination of radium in man since 1915
[DE92-000355] N92-12410
Detection system characteristics using Cf-252 ionization chambers
[DE90-011702] N92-12610
A scintillation detector for measuring inert gas beta rays
[DE91-630700] N92-12634

SEA LEVEL
Precise relative sea surface positioning of a floating platform using the Global Positioning System (GPS) N92-11987

SEA SURFACE TEMPERATURE
An atlas of monthly mean distributions of GEOSAT sea surface height, SSMI surface wind speed, AVHRR/2 sea surface temperature, and ECMWF surface wind components during 1988
[NASA-CR-189029] N92-12385

SEA WATER
Production of desalinated water using ocean thermal energy
[DE91-018894] N92-12336
The need for superconducting magnets for MHD seawater propulsion
[DE90-013651] N92-12705

SEALS (STOPPERS)
Operations manual for reading VAK-3 ultrasonic seals using a data acquisition box
[DE90-013644] N92-12143

SEAS
Particle measurement and brine chemistry at the Salton Sea Deep Well
[DE92-000031] N92-12337

SECURITY
Unattended optical surveillance equipment
[DE90-013403] N92-12228

SEISMIC WAVES
Three-dimensional explicit depth migration via McClellan transformations on hexagonal sampling grids
[DE91-017370] N92-12558
SELECTIVE SURFACES
Numerical and experimental study of curved and planar frequency selective surfaces with arbitrary illumination
[NASA-TM-104540] N92-12185
SEMANTICS
The syntax and semantics of micro CRL
[CWI-CS-R9076] N92-12480
Program calculation properties of continuous algebras
[CWI-CS-R9104] N92-12484
SEMICONDUCTING FILMS
Design and study of photon-assisted heteroepitaxial growth system
[LAAS-91187] N92-12753
SEMICONDUCTOR DEVICES
Recovery of high field GaAs photoconductive semiconductor switches
[DE90-013062] N92-12163
The state variable method as a unifying approach to the study of semiconductor devices
[REPT-90-045] N92-12187
Tests on photoconductive semiconductor switches for subnanosecond risetime, multimegavolt pulser applications
[DE91-018797] N92-12190
Energy models for one-carrier transport in semiconductor devices
[NASA-CR-189046] N92-12557
Derivation of the high field semiconductor equations
[DE92-000249] N92-12763
SEMICONDUCTOR DIODES
Coherent communication link using diode-pumped lasers
[NASA-CR-189248] N92-12149
Fast Optically Sensitive Segmented Array (FOSSA)
[DE91-018997] N92-12684
SEMICONDUCTOR JUNCTIONS
Research on stable, high-efficiency, amorphous silicon multijunction modules
[DE91-015002] N92-12335
SEMICONDUCTOR LASERS
Coherent communication link using diode-pumped lasers
[NASA-CR-189248] N92-12149
SEMICONDUCTORS (MATERIALS)
Research on stable, high-efficiency, amorphous silicon multijunction modules
[DE91-015002] N92-12335
Derivation of the high field semiconductor equations
[DE92-000249] N92-12763
SENSITIVITY
On simple aerodynamic sensitivity derivatives for use in interdisciplinary optimization
[NASA-TM-104145] N92-11985
Quick separation and determination of Pm-147 in water by HDEHP-KeL-F chromatography
[DE91-628873] N92-12094
SEQUENCING
Authentication of byte sequences
[DE92-000150] N92-12492
SERIES EXPANSION
Algebraic calculation of stroboscopic maps of ordinary, nonlinear differential equations
[DE92-000220] N92-12578
SERVICE LIFE
Performance evaluation of advanced battery technologies for electric vehicle applications
[DE90-013895] N92-12171
SERVOCONTROL
A virtual sensor approach to robot kinematic identification: Theory and experimental implementation
[DE90-012186] N92-12267
SET THEORY
Tait's flyping conjecture for well-connected links
[CWI-BS-R9037] N92-12584
SEYFERT GALAXIES
Optical observations of active galactic nuclei N92-12946
X ray emission from active galactic nuclei N92-12962
Extragalactic x ray source counts N92-12967
MERLIN observations of 4C29.6 (3C59) and 4C35.37: Two radio structures misidentified with Seyfert galaxies
[MPE-PREPRINT-204] N92-12984
SHALLOW WATER
A standard test set for numerical approximations to the shallow water equations in spherical geometry
[DE92-000385] N92-12365
Three dimensional shallow water model on the Cray Y-MP4/464
[CWI-NM-R9106] N92-12487
SHAPES
Theory of inclusions in the elastic and elastic-plastic deformation of composite materials N92-12056
Recognition of three dimensional shapes: Application to chemical molecules
[TELECOM-PARIS-90-E-018] N92-12613
SHEAR FLOW
Numerical simulation of compressible homogeneous turbulence N92-12204
Turbulization of shear flows in astrophysics N92-12941
SHEAR LAYERS
Vorticity dynamics of inviscid shear layers
[NASA-CR-189042] N92-12212
SHEAR STRESS
Influences of expanding monomer on carbon fiber reinforced epoxy composites 2
[AD-A240583] N92-12057
Advanced study in solid transport: Rheological behavior of dense suspension
[DE90-009025] N92-12196
SHELLS (STRUCTURAL FORMS)
Optimal design of nonlinear shell structures
[FFA-TN-1991-18] N92-12312
SHERGOTTITES
A liquidus phase diagram for a primitive shergottite N92-12916
Nd-142/Nd-144 in SNCs and early differentiation of a heterogeneous Martian mantle N92-12925
SHIPS
SAR imaging of vortex ship wakes. Volume 3: An overview of pre-ERS-1 observations and models
[FFI-91/7007-VOL-3] N92-12157
SHOCK TESTS
Modification of amino acids at shock pressures of 3 to 30 GPA: Initial results N92-12926
SHOCK TUBES
Richtmyer-Meshkov instability of shocked gaseous interfaces
[DE92-000308] N92-12225
SHOCK WAVE PROFILES
Measurement of charge exchange reaction constants both at equilibrium and out of equilibrium in a Paul trap
[ETN-91-90103] N92-12361
SHOCK WAVES
Over forty years of continuous research at UTIAS on nonstationary flows and shock waves
[UTIAS-50] N92-11974
Shock characterization of nitrocellulose-based gun propellant
[DE91-019057] N92-12137
Effects of wake and shock passing on the heat transfer to a film cooled transonic turbine blade N92-12201
Richtmyer-Meshkov instability of shocked gaseous interfaces
[DE92-000308] N92-12225
Comparison of some different formulae for ground shock prediction
[FFI-90/4006] N92-12363
Modification of amino acids at shock pressures of 3 to 30 GPA: Initial results N92-12926
The shock breakout in SN1987A modelled with the time-dependent radiative transfer N92-12939
Gas flow and generation of x ray emission in WR+OB binaries N92-12972
SHRINKAGE
Influences of expanding monomer on carbon fiber reinforced epoxy composites 2
[AD-A240583] N92-12057
SIALON
Mechanical properties and microstructure of pressureless sintered duophase sialon
[DE92-000043] N92-12131
SIDESLIP
Development of a pneumatic high-angle-of-attack flush airdata sensing (HI-FADS) system
[NASA-TM-104241] N92-11994
Computer programs for the calculation of dual sting pitch and roll angles required for an articulated sting to obtain angles of attack and sideslip on wind-tunnel models
[NASA-TM-104161] N92-12007
SIGNAL ANALYSIS
The acoustic emission characteristics of solidification and formation of casting defects in aluminum alloy 319 N92-12101
SIGNAL ANALYZERS
Code generation for fast DSP-based real-time control N92-12462
SIGNAL DETECTION
Future ESM systems and the potential for neural processing N92-12526
SIGNAL DETECTORS
Linearisation of diode detectors for use in a multistate reflectometer
[NPL-DES-104] N92-12241
Design of a long isotropic buffer rod
[NRC-28903] N92-12290
SIGNAL PROCESSING
Space and Earth Science Data Compression Workshop
[NASA-CP-3130] N92-12425
Code generation for fast DSP-based real-time control N92-12462
SIGNAL TO NOISE RATIOS
Inspection of materials and structures by infrared thermography: Signal processing techniques for defect enhancement and characterization
[NRC-29717] N92-12291
Helicopter main-rotor speed effects: A comparison of predicted ranges of detection from the aural detection program ICHIN and the electronic detection program ARCAS
[NASA-TM-104134] N92-12598
Design and testing of 3-level optimal correlation filters
[DE91-019059] N92-12685
SILICATES
Modification of amino acids at shock pressures of 3 to 30 GPA: Initial results N92-12926
SILICON
Tests on photoconductive semiconductor switches for subnanosecond risetime, multimegavolt pulser applications
[DE91-018797] N92-12190
Microsensor research
[DE90-011801] N92-12227
Orientation dependency of structural and chemical properties of Si(001) vicinal surfaces
[ETN-91-90154] N92-12754
Charge states of donor-hydrogen pairs in Si: A fragile balance
[DE91-018794] N92-12757
Distribution of silicon between kamacite and taenite N92-12911
SILICON CARBIDES
Interface effects and fracture in Nicalon/SiC composites
[DE90-012925] N92-12055
A brief review of wrought aluminum alloy metal matrix composites reinforced by silicon carbide whiskers
[NRC-LTR-ST-1765] N92-12058
High-temperature corrosion of Nicalon(tm)/SiC composites
[DE92-000281] N92-12071
The interaction of SiC with Fe, Ni, and their alloys
[ETN-91-90137] N92-12103
Vickers microindentation toughness of a sintered SiC in the median-crack regime
[DE92-000225] N92-12132
Material and lubricant relationships in the tribology of internal combustion engines
[DE92-000674] N92-12284
Strengthening of composites by internal stresses: Determination by neutron diffraction
[DE91-018549] N92-12756
SILICON DIOXIDE
New technology for linear colliders
[DE92-000081] N92-12664
SILICON NITRIDES
Atomic oxygen interaction with spacecraft materials: Relationship between orbital and ground-based testing for materials certification
[NASA-TM-105449] N92-12046
Material and lubricant relationships in the tribology of internal combustion engines
[DE92-000674] N92-12284
SIMULATION
Examination of sampling control systems for inverters of limited pulse repetition
[ETN-91-90159] N92-12181
A contribution to the identification of internal faults in electrical machines
[ETN-91-90167] N92-12183
A comparison of three methods for solving flow equations of two immiscible fluids in variably saturated media
[DE91-016945] N92-12220
The modelling of turbulence and downbursts for flight simulators
[UTIAS-339] N92-12373
Analyst workbench N92-12464
Large Hadron Collider Workshop. Volume 2: Proceedings
[DE91-634595] N92-12663
Nonlinear resonant absorption and wave breaking (Vlasov simulation of resonance excited plasma waves)
[ETN-91-90172] N92-12714
Laboratory simulation of the surface of Halley's Comet N92-12872
SINGLE CRYSTALS
Analysis of cladded uniaxial single crystal fibers
[NRC-32596] N92-12678

Stoichiometry and irradiation effects in melt grown Tl-Ca-Ba-Cu-O single crystals
[DE90-013365] N92-12749
Orientation dependency of structural and chemical properties of Si(001) vicinal surfaces
[ETN-91-90154] N92-12754
Magnetization studies of irradiation modified single crystal Y1Ba2Cu3O7 superconductors: Flux creep and annealing effects
[DE91-018858] N92-12758

SINGLE EVENT UPSETS
High energy SEU test results for the commercially available MIPS R3000 microprocessor and R3010 floating point unit
[DE91-019019] N92-12441

SINGLE STAGE TO ORBIT VEHICLES
Air-breathing hypersonic vehicle guidance and control studies; An integrated trajectory/control analysis methodology: Phase 1
[NASA-CR-187623] N92-12002

SINGULARITY (MATHEMATICS)
General pole structure assignment in singular systems
[MATHS-REPT-A-147] N92-12554

SINTERING
Mechanical properties and microstructure of pressureless sintered duophase sialon
[DE92-000043] N92-12131

SIZE DISTRIBUTION
Planar laser imaging of sprays for liquid rocket studies N92-12051

SKY SURVEYS (ASTRONOMY)
Search for planet X N92-12816

SLABS
The characters of slab lasers
[DE90-625397] N92-12246

SLEEP
Pattern recognition in biosignals. Application to the sigma spindles in sleep electroencephalograms
[ETN-91-90166] N92-12407

SLENDER BODIES
Pitching moment derivative due to rate of pitch for projectiles at supersonic speeds
[ESDU-91004] N92-11967

SLOPES
Asteroid absolute magnitudes and slope parameters N92-12888

SLOTS
Turbulence control by intake
[CERT-RF-67/5004-37] N92-12211

SLOTTED WIND TUNNELS
Slotted-wall research with disk and parachute models in the DSMA low-speed wind tunnel
[DE90-013631] N92-11966

SLURRIES
Method for producing oxygen from lunar materials
[NASA-CASE-MSC-21759-1] N92-12079

SMOKE ABATEMENT
Evaluation of the physiological effects of an additional dead space involved in wearing an anti-smoke mask
[REPT-9/CEV/SE/LAMAS] N92-12420

SMOOTHING
Smoothed Runge-Kutta methods in the method of lines
[CWI-NM-R9101] N92-12565

SOCIAL FACTORS
Modular organization of domestic care in Weert (Netherlands)
[ISBN-90-6757-045-1] N92-12772

SODIUM
Observational studies of the exospheres of the Moon and Mercury N92-12839

SODIUM VAPOR
Sodium and potassium in the lunar atmosphere N92-12884

SOFTWARE ENGINEERING
Advanced technologies for Mission Control Centers N92-12028
Software for Guidance and Control
[AGARD-CP-503] N92-12449
Tool supported software development experiences from the EFA project N92-12451
Requirements and traceability management N92-12453
Software design considerations for an airborne command and control workstation N92-12455
Formal specification of satellite telemetry: A practical experience N92-12456
Network programming: A design method and programming strategy for large software systems N92-12459
The data oriented requirements implementation scheme N92-12460
Process/object-oriented Ada software design for an experimental helicopter N92-12461
A practical experience of Ada for developing embedded software N92-12465
Development and verification of software for flight safety critical systems N92-12469
DBMS problems on the evolution of relational model to object model
[REPT-90-069] N92-12488
Reverse engineering tools for software: A small study
[DE92-000650] N92-12495
A distributed environment for testing cooperating expert systems N92-12519
Development of tactical decision aids N92-12532

SOFTWARE TOOLS
A survey of available tools and methods for software requirements capture and design N92-12450
Tool supported software development experiences from the EFA project N92-12451
Requirements and traceability management N92-12453
The data oriented requirements implementation scheme N92-12460
Analyst workbench N92-12464
Common Ada Missile Packages (CAMP) N92-12468
Reverse engineering tools for software: A small study
[DE92-000650] N92-12495

SOIL MECHANICS
The effect of berming on the response of structures subjected to nearby detonations
[FFI-91/4005] N92-12310

SOIL MOISTURE
Microwave remote sensing and radar polarization signatures of natural fields
[NASA-CR-189249] N92-12317

SOILS
Mercury as an environmental pollutant
[DE90-013392] N92-12349

SOL-GEL PROCESSES
Current issues in sol-gel reaction kinetics
[DE90-012226] N92-12074
Piezoelectric devices using sol gel thin films
[NRC-31370] N92-12751

SOLAR ACTIVITY
Solar-geophysical data number 561, May 1991. Part 1: (Prompt reports). Data for April, March 1991, and late data
[PB91-217331] N92-12980

SOLAR ARRAYS
Solar array management guide
[REPT-911-440-114] N92-12778

SOLAR ATMOSPHERE
Absolute velocity measurements in the solar transition region and corona from observations of ultraviolet emission line profiles N92-12977
The formation, structure and dissipation of direct electric current systems in the solar atmosphere N92-12979

SOLAR CELLS
Atomic oxygen interaction with spacecraft materials: Relationship between orbital and ground-based testing for materials certification
[NASA-TM-105449] N92-12046
Results of the 1991 NASA/JPL balloon flight solar cell calibration program
[NASA-CR-188968] N92-12332
Research on stable, high-efficiency, amorphous silicon multijunction modules
[DE91-015002] N92-12335

SOLAR COLLECTORS
Trends in dish-Stirling solar receiver designs
[DE90-011507] N92-12324

SOLAR CORONA
Absolute velocity measurements in the solar transition region and corona from observations of ultraviolet emission line profiles N92-12977

SOLAR ENERGY
Results and the future of research, part 2
[DE90-503494] N92-12987

SOLAR ENERGY CONVERSION
Trends in dish-Stirling solar receiver designs
[DE90-011507] N92-12324

SOLAR FLARES
On the vulnerability of electric power to geomagnetic storms
[DE90-013929] N92-12368
High energy SEU test results for the commercially available MIPS R3000 microprocessor and R3010 floating point unit
[DE91-019019] N92-12441
Influence of wave-particle interactions on solar flare dynamics N92-12978
Solar-geophysical data number 561, May 1991. Part 1: (Prompt reports). Data for April, March 1991, and late data
[PB91-217331] N92-12980
Solar-geophysical data number 561, May 1991. Part 2: (Comprehensive reports): Data for November 1990 and miscellaneous
[PB91-217349] N92-12981

SOLAR GENERATORS
Photovoltaics: New opportunities for utilities
[DE91-002168] N92-12334
Results and the future of research, part 2
[DE90-503494] N92-12987

SOLAR HEATING
Conventional wallboard with latent heat storage for passive solar applications
[DE90-012136] N92-12325
Analysis of wallboard containing a phase change material
[DE90-012163] N92-12326

SOLAR MAGNETIC FIELD
The formation, structure and dissipation of direct electric current systems in the solar atmosphere N92-12979

SOLAR MESOSPHERE EXPLORER
Lessons learned in control center technologies and non-technologies N92-12026

SOLAR ORBITS
Long term changes in reflectivity and large scale motions in the atmosphere of Jupiter and Saturn N92-12795
Search for planet X N92-12816

SOLAR PHYSICS
Solar-geophysical data number 561, May 1991. Part 1: (Prompt reports). Data for April, March 1991, and late data
[PB91-217331] N92-12980
Solar-geophysical data number 561, May 1991. Part 2: (Comprehensive reports): Data for November 1990 and miscellaneous
[PB91-217349] N92-12981

SOLAR PROMINENCES
Solar-geophysical data number 561, May 1991. Part 2: (Comprehensive reports): Data for November 1990 and miscellaneous
[PB91-217349] N92-12981

SOLAR RADIO BURSTS
Solar-geophysical data number 561, May 1991. Part 2: (Comprehensive reports): Data for November 1990 and miscellaneous
[PB91-217349] N92-12981

SOLAR RADIO EMISSION
Solar-geophysical data number 561, May 1991. Part 1: (Prompt reports). Data for April, March 1991, and late data
[PB91-217331] N92-12980

SOLAR SPECTRA
Absolute velocity measurements in the solar transition region and corona from observations of ultraviolet emission line profiles N92-12977

SOLAR SYSTEM
Occultation studies of the solar system N92-12810
Surveying of the solar system N92-12813
Studies of relationships among outer solar system small bodies and related objects N92-12818
Infrared observations of solar system objects N92-12828
Outer planet studies N92-12829
Occultation studies of the solar system N92-12834
Radar studies in the solar system N92-12843
Planetary astronomy N92-12844
Planetary optical and infrared imaging N92-12849
Visible and infrared investigations of planet-crossing asteroids and outer solar system objects N92-12851
A continued program of planetary study at the University of Texas McDonald Observatory N92-12852
Compositional studies of primitive asteroids N92-12853
Goldstone solar system radar N92-12873
Radar studies in the solar system N92-12886
Clathrate type 2 hydrate formation in vacuo under astrophysical conditions N92-12906
Cs-135 - Ba-135: A new cosmochronometric constraint on the origin of the Earth and the astrophysical site of the origin of the solar system N92-12915

SOLAR SYSTEM EVOLUTION
Observations of comets and asteroids N92-12793

SOLAR TERRESTRIAL INTERACTIONS
Solar-geophysical data number 561, May 1991. Part 1: (Prompt reports). Data for April, March 1991, and late data
[PB91-217331] N92-12980

SOLAR WIND
On the vulnerability of electric power to geomagnetic storms
[DE90-013929] N92-12368
Evolution on large-scale plasma structures in comets: Kinematics and physics N92-12801
Imaging studies of comets N92-12836
Sodium and potassium in the lunar atmosphere N92-12884

SOLAR X-RAYS
Solar-geophysical data number 561, May 1991. Part 2: (Comprehensive reports): Data for November 1990 and miscellaneous
[PB91-217349] N92-12981

SOLID LUBRICANTS
Atomic oxygen interaction with spacecraft materials: Relationship between orbital and ground-based testing for materials certification
[NASA-TM-105449] N92-12046
SOLID MECHANICS
Identification of the mechanical behavior of solid materials
[ISBN-90-386-0041-0] N92-12304
SOLID PHASES
Physicochemical investigation of the compatibilization of polyolefin/polyamide blends: Morphology, thermal analysis, and specific interactions
[NRC-29455] N92-12124
SOLID ROCKET PROPELLANTS
The 27th JANNAF Combustion Subcommittee Meeting, Volume 1
[CPIA-PUBL-557-VOL-1] N92-12048
SOLID STATE
Integrated, non-volatile, high-speed analog random access memory
[NASA-CASE-NPO-17998-1-CU] N92-12438
Solid state radioluminescent sources using tritium-loaded zeolites
[DE91-019061] N92-12759
Methanol in the sky with diamonds N92-12903
SOLID STATE LASERS
The characters of slab lasers
[DE90-625397] N92-12246
A tunable continuous-wave titanium-doped sapphire laser
[FFI-91/7006] N92-12254
Flashlamp pumping of Nd:glass disk amplifiers
[DE90-013482] N92-12703
SOLID WASTES
Priority pollutant analysis of MHD-derived combustion products
[DE90-012630] N92-12689
SOLID-SOLID INTERFACES
Interface effects and fracture in Nicalon/SiC composites
[DE90-012925] N92-12055
SOLIDIFICATION
The acoustic emission characteristics of solidification and formation of casting defects in aluminum alloy 319 N92-12101
Materials processing in low gravity
[NASA-CR-184213] N92-12139
Modifications to the rapid melt/rapid quench and transparent polymer video furnaces for the KC-135
[NASA-CR-184215] N92-12231
SOLIDS
Application of parallel computing to the Monte Carlo simulation of electron scattering in solids: A rapid method for profile deconvolution
[DE90-009322] N92-12072
Detection of solid C(triple bond)N bearing materials on solar system bodies N92-12866
SOLITARY WAVES
Generation of auroral kilometric radiation in upper hybrid wave-lower hybrid soliton interaction
[MPE-PREPRINT-202] N92-12364
Simple model of the gaseous plasma and its soliton solutions
[NRC-30824] N92-12712
SOLUBILITY
A comparison of three methods for solving flow equations of two immiscible fluids in variably saturated media
[DE91-016945] N92-12220
Transformation and deposition of atmospheric nitrogen species: A view from the aqueous side
[DE90-013737] N92-12348
SOLVENT EXTRACTION
Quick separation and determination of Pm-147 in water by HDEHP-KeL-F chromatography
[DE91-628873] N92-12094
SOUND PRESSURE
Vacuum-isolation vessel and method for measurement of thermal noise in microphones
[NASA-CASE-LAR-14567-1-CU] N92-12174
SOUND WAVES
Position and velocity measuring system
[AD-D014975] N92-12232
Waves and fields in structural acoustics: Fluid-loaded elastic cylindrical and spherical shells N92-12597
SOUTH AMERICA
A summary of the status of biomass conversion technologies and opportunities for their use in Latin America
[DE90-012284] N92-12328
SPACE BASES
Multimegawatt space power reactors
[DE90-012965] N92-12657
SPACE COMMUNICATION
Evaluation of components, subsystems, and networks for high rate, high frequency space communications
[NASA-TM-105274] N92-12151
SPACE EXPLORATION
JPL's Space Flight Operations Center: Development project overview N92-12012
An integrated energy approach to providing power and propulsion for the Space Exploration Initiative
[DE92-000143] N92-12054
SPACE FLIGHT
Ames life science telescience testbed evaluation
[NASA-CR-188856] N92-12033
MTFF operations
[MBB-UO-0075-91-PUB] N92-12043
Effect of space flight on interferon production - mechanistic studies
[NASA-CR-188972] N92-12390
SPACE HEATING (BUILDINGS)
Conventional wallboard with latent heat storage for passive solar applications
[DE90-012136] N92-12325
Analysis of wallboard containing a phase change material
[DE90-012163] N92-12326
SPACE LOGISTICS
Launch site operations for Columbus Free Flyer and resupply mission
[MBB-UO-0153-91-PUB] N92-12034
Columbus Free Flying Laboratory (MTFF) logistics, transportation, and ground processing
[MBB-UO-0155-91-PUB] N92-12589
SPACE MAINTENANCE
Welding in Space Workshop
[NASA-CR-184234] N92-12269
SPACE MANUFACTURING
An analysis of thermosolutal convection during the crystal growth of CdTe from Te solution by the THM
[REPT-911-430-135] N92-12755
SPACE MISSIONS
Space shuttle Mission Control Center upgrade N92-12015
Control center operations at the Goddard Space Flight Center N92-12023
Huntsville Operations Support Center N92-12024
SPACE OBSERVATIONS (FROM EARTH)
Space and Earth Science Data Compression Workshop
[NASA-CP-3130] N92-12425
Observations of comets and asteroids N92-12793
Photometry of Pluto-Charon mutual events and Hirayama family asteroids N92-12799
Infrared observations of comets N92-12815
Search for planet X N92-12816
Astrometric observations of comets and asteroids and subsequent orbital investigations N92-12830
Observational evidence of aging processes in comets N92-12833
Ground-based observations of comets, the Jupiter plasma Torus, and Io N92-12840
Groundbased cometary studies N92-12841
Radar studies in the solar system N92-12843
Physical observations of comets: Their composition, origin and evolution N92-12864
SPACE OPERATIONS CENTER (NASA)
JPL's Space Flight Operations Center: Development project overview N92-12012
SPACE PLASMAS
A differential charging model for synchronous satellites N92-12041
Scientific requirements for space science data systems N92-12429
On the nature of pulsar radiation N92-12956
SPACE PLATFORMS
Sensory processing and world modeling for an active ranging device
[NASA-CR-188915] N92-12319
SPACE POWER REACTORS
Nuclear power engineering in space
[DE90-012743] N92-12656
Multimegawatt space power reactors
[DE90-012965] N92-12657
SPACE PROCESSING
Materials processing in low gravity
[NASA-CR-184213] N92-12139
Combined buoyancy-thermocapillary convection
[NASA-CR-187417] N92-12207
Modifications to the rapid melt/rapid quench and transparent polymer video furnaces for the KC-135
[NASA-CR-184215] N92-12231
An analysis of thermosolutal convection during the crystal growth of CdTe from Te solution by the THM
[REPT-911-430-135] N92-12755
SPACE PROGRAMS
Evaluation of components, subsystems, and networks for high rate, high frequency space communications
[NASA-TM-105274] N92-12151
SPACE SHUTTLE MAIN ENGINE
Velocity and pressure characteristics of a model SSME high pressure fuel turbopump
[NASA-CR-184239] N92-12273
Composite load spectra for select space propulsion structural components
[NASA-CR-189048] N92-12306
SPACE SHUTTLE PAYLOADS
Vibroacoustic Payload Environment Prediction System (VAPEPS): VAPEPS management center remote access guide
[NASA-CR-189448] N92-12292
SPACE SHUTTLES
The design and performance estimates for the propulsion module for the booster of a TSTO vehicle
[NASA-TM-105299] N92-11995
Space shuttle Mission Control Center upgrade N92-12015
MacSPOC: Orbital trajectory calculations on a laptop computer N92-12027
Safety Evaluation Report for Ulysses, volume 1
[DE91-013473] N92-12047
Composite load spectra for select space propulsion structural components
[NASA-CR-189048] N92-12306
Atmospheric environment for Space Shuttle (STS-37) launch
[NASA-TM-103556] N92-12375
SPACE STATION FREEDOM
Automating a spacecraft electrical power system using expert systems
[NASA-TP-3161] N92-12052
SPACE STATION POWER SUPPLIES
The effect of on/off indicator design on state confusion, preference, and response time performance, executive summary
[NASA-CR-185662] N92-12416
SPACE STATIONS
Space station control center architecture N92-12016
Ames life science telescience testbed evaluation
[NASA-CR-188856] N92-12033
The effect of on/off indicator design on state confusion, preference, and response time performance, executive summary
[NASA-CR-185662] N92-12416
SPACE TRANSPORTATION SYSTEM FLIGHTS
Space shuttle Mission Control Center upgrade N92-12015
SPACE VEHICLE CHECKOUT PROGRAM
Kennedy Space Center Launch Processing System (LPS) and the Test Checkout and Monitoring System 2 (TCMS2) N92-12013
SPACE-TIME FUNCTIONS
Bit-string scattering theory
[DE90-008013] N92-12555
SPACEBORNE ASTRONOMY
Reports of planetary astronomy, 1991
[NASA-TM-4329] N92-12792
SPACEBORNE EXPERIMENTS
Thermal design and test results for SUNLITE ultra-stable reference cavity
[NASA-TM-104117] N92-12045
Optical studies in the holographic ground station
[NASA-CR-184257] N92-12239
Combined Release and Radiation Effects Satellite (CRRES) Experiment: Educational planning and coordination
[NASA-CR-184255] N92-12362
Cosmos-1989 immunology studies
[NASA-CR-188970] N92-12389
Microgravity science requirements and the need for data compression N92-12430
Georgian space research program N92-12955
SPACEBORNE TELESCOPES
Georgian space research program N92-12955
SPACECRAFT CHARGING
A differential charging model for synchronous satellites N92-12041
SPACECRAFT COMMUNICATION
Automation for deep space vehicle monitoring N92-12022
Lessons learned in control center technologies and non-technologies N92-12026
SPACECRAFT CONSTRUCTION MATERIALS
Atomic oxygen interaction with spacecraft materials: Relationship between orbital and ground-based testing for materials certification
[NASA-TM-105449] N92-12046
Composite load spectra for select space propulsion structural components
[NASA-CR-189048] N92-12306

SPACECRAFT CONTROL
Planning systems for pioneer mission control N92-12021
Control center operations at the Goddard Space Flight Center N92-12023
Lessons learned in control center technologies and non-technologies N92-12026
Optimal control of large space structures using distributed gyricity: A continuum approach [UTIAS-341] N92-12042
SPACECRAFT DESIGN
The Columbus Free Flying Laboratory: Mechanical design aspects [MBB-UO-0152-91-PUB] N92-12044
NASA reliability preferred practices for design and test [NASA-TM-4322] N92-12286
Ergonomics applied to operational systems in space stations [NRC-28710] N92-12418
Columbus Free Flyer Center: Tasks and manpower profiles [MBB-UO-0154-91-PUB] N92-12588
SPACECRAFT ENVIRONMENTS
Ultrasonic applications for space-based life support systems N92-12415
Ergonomics applied to operational systems in space stations [NRC-28710] N92-12418
SPACECRAFT INSTRUMENTS
Sensory processing and world modeling for an active ranging device [NASA-CR-188915] N92-12319
SPACECRAFT LAUNCHING
Kennedy Space Center Launch Processing System (LPS) and the Test Checkout and Monitoring System 2 (TCMS2) N92-12013
Safety Evaluation Report for Ulysses, volume 1 [DE91-013473] N92-12047
Atmospheric environment for Space Shuttle (STS-37) launch [NASA-TM-103556] N92-12375
SPACECRAFT MAINTENANCE
SHARP: Spacecraft Health Automated Reasoning Prototype N92-12020
SPACECRAFT POWER SUPPLIES
Automating a spacecraft electrical power system using expert systems [NASA-TP-3161] N92-12052
An integrated energy approach to providing power and propulsion for the Space Exploration Initiative [DE92-000143] N92-12054
Spacecraft electrical power system fault detection/diagnosis and resource management N92-12523
Multimegawatt space power reactors [DE90-012965] N92-12657
SPACECRAFT TRAJECTORIES
Planning systems for pioneer mission control N92-12021
SPACELAB PAYLOADS
Optical studies in the holographic ground station [NASA-CR-184257] N92-12239
SPATIAL RESOLUTION
Occultation studies of the solar system N92-12810
SPECIFIC HEAT
Thermal conductivity of gaseous halogenated hydrocarbons [ESDU-91005] N92-12080
Pressure dependence of the specific heat of heavy-fermion YbCu4.5 [DE90-011584] N92-12742
Specific heat of La(2-x)Sr(x)CuO4; volume fraction of superconductivity; possible structural transition at 45 K [DE90-011585] N92-12744
SPECIFICATIONS
Characterization and development report for the 381558 [DE90-010395] N92-12161
A methodology for software specification and development based on simulation N92-12458
SPECKLE PATTERNS
Infrared speckle interferometry and spectroscopy of Io N92-12820
Infrared speckle interferometry and spectroscopy of Io N92-12870
SPECTRA
Visual and near-IR spectrophotometry of asteroids N92-12878
SPECTRAL METHODS
Numerical and experimental study of curved and planar frequency selective surfaces with arbitrary illumination [NASA-TM-104540] N92-12185
Ocean/bottom acoustic interaction with arbitrary bottom profile [FFI-91/7009] N92-12386
The ODE formulation of hyperbolic PDE's discretized by the spectral collocation method [FFI-91/7011] N92-12576
Spectral factorization of linear periodic systems with application to the optimal prediction of periodic ARMA models [REPT-90-013] N92-12768
SPECTRAL REFLECTANCE
Compositional studies of primitive asteroids N92-12853
SPECTRAL RESOLUTION
Development of high spectral resolution lidar technology [DE92-000080] N92-12686
SPECTRAL SIGNATURES
Preliminary analysis of baseline vibration data from Allison T56-A-14FE engine and reduction gearbox [NRC-31578] N92-11999
Local states in one-dimensional CDW (Charge Density Wave) materials: Spectral signatures for polarons and bipolarons in MX chains [DE90-013150] N92-12605
SPECTROMETERS
A fast online event display for a high intensity fixed-target spectrometer [DE90-012047] N92-12443
The radial velocity search for extrasolar planets N92-12832
Georgian space research program N92-12955
SPECTROPHOTOMETRY
Infrared observations of comets N92-12815
Visual and near-IR spectrophotometry of asteroids N92-12878
SPECTROSCOPIC ANALYSIS
Spectroscopic analysis of a discharge and a post discharge within a low pressure air stream [ETN-91-90098] N92-12086
Neutron Brillouin scattering in a metallic glass [DE92-000219] N92-12642
Strangeness production at 200 GeV/Nucleon [DE92-000259] N92-12646
Imaging analysis of LDEF craters N92-12927
SPECTROSCOPY
The far infrared optical constants of some common polymers [NPL-DES-111] N92-12682
A wall stabilized arc as a light source for spectroscopic techniques [ETN-91-90308] N92-12715
Planetary Spectroscopy N92-12811
SPECTRUM ANALYSIS
Preliminary analysis of baseline vibration data from Allison T56-A-14FE engine and reduction gearbox [NRC-31578] N92-11999
The calculation of theoretical coherent anti-Stokes Raman spectra [NRC-29810] N92-12085
Infrared observations of solar system objects N92-12828
Compositional studies of primitive asteroids N92-12853
Global scale auroral emissions on Jupiter N92-12891
Tentative identification of a newly discovered class of material on Io N92-12892
Compositional studies of primitive asteroids N92-12893
Astrometric observations of comets and minor planets N92-12894
Quasi-periodic oscillations in low-mass x ray binaries N92-12958
Physical conditions and heating/cooling processes in high mass star formation regions [MPE-PREPRINT-200] N92-12974
SPEECH RECOGNITION
An empirical investigation of sparse distributed memory using discrete speech recognition [NASA-CR-187893] N92-12437
SPENT FUELS
Operations manual for reading VAK-3 ultrasonic seals using a data acquisition box [DE90-013644] N92-12143
SPHERICAL SHELLS
Waves and fields in structural acoustics: Fluid-loaded elastic cylindrical and spherical shells N92-12597
SPIN DYNAMICS
Halley's spin state determined N92-12858
SPIN EXCHANGE
Spin-exchange and dipole relaxation rates in atomic hydrogen: Rigorous and simplified calculations N92-12622
SPIN-LATTICE RELAXATION
Few-body collisions in a weakly interacting Bose gas [ETN-91-90307] N92-12621
Decay of spin-polarized atomic hydrogen in the presence of a Bose condensate N92-12624
Nonsingular integral equation for two-body scattering and applications in two and three dimensions N92-12625
Spin-polarized atomic hydrogen in very strong magnetic fields N92-12626
SPIRAL GALAXIES
The peculiar velocity field predicted from the distribution of IRAS galaxies N92-12969
SPORES
An evaluation of the potential of combination processes involving heat and irradiation for food preservation [DE91-638734] N92-12423
SPRAY CHARACTERISTICS
A planar-fluorescence imaging technique for studying droplet-turbulence interactions in vaporizing sprays N92-12050
Planar laser imaging of sprays for liquid rocket studies N92-12051
SPRAYING
Kapuskasing field study relating atmospheric stability to wind drift from aerial forest spray operations [NRC-LTR-UA-99] N92-12372
SPUTTERING
Laser conditioning of optical thin films [DE90-013483] N92-12672
Sodium and potassium in the lunar atmosphere N92-12884
STABILITY
The stability of graphite brushes at high velocity [ETN-91-90176] N92-12184
The stability of numerical boundary treatments for compact high-order finite-difference schemes [NASA-CR-187628] N92-12556
Ion stability in bunched electron beams [DE90-014087] N92-12611
STABILITY DERIVATIVES
On simple aerodynamic sensitivity derivatives for use in interdisciplinary optimization [NASA-TM-104145] N92-11985
STABILIZATION
Robustness of feedback stabilization: A topological approach [ETN-91-90142] N92-12545
STABILIZERS (FLUID DYNAMICS)
Tutor aft fuselage and empennage full-scale fatigue test: Resolution of horizontal stabilizer installation difficulties [NRC-LTR-ST-1804] N92-11990
STAINLESS STEELS
Cryogenic testing of fluoropolymer-coated stainless steel tubing [DE90-008022] N92-12098
Strength evaluation for modified 12Cr steel and A286 steel of USC turbine rotor materials [DE90-503033] N92-12099
The EDM surface: Topography, chemistry, and metallurgy [DE91-017756] N92-12110
A method for multiaxial fatigue life prediction using energy approaches [DE91-018851] N92-12315
STANDARDIZATION
Use of a standardized test battery for the evaluation of psychomotor performances [CERMA-90-44(LCBA)] N92-12414
STANDARDS
Thermal effects on the Josephson series-array voltage standard [DE90-008738] N92-12160
Calibration of an FTI Omnitrak ballistic flow calibrator system [NRC-29847] N92-12233
Results of the 1991 NASA/JPL balloon flight solar cell calibration program [NASA-CR-188968] N92-12332
Military and civil software standards and guidelines for guidance and control N92-12452
Networking standards N92-12499
STAR CLUSTERS
Radiation-driven evolution of low-mass x ray binaries and the formation of millisecond pulsars [DE92-000123] N92-12975
STAR FORMATION
Infrared studies of star formation in the rho Ophiuchi dark cloud N92-12790
Observations of comets and asteroids N92-12793
Physical conditions and heating/cooling processes in high mass star formation regions [MPE-PREPRINT-200] N92-12974
STARQUAKES
Neutron starquake model for gamma-ray bursts N92-12938
STARS
Probing Titan's atmosphere with a stellar occultation N92-12871

STARTING
Starting currents in coils with conductive permeable core, allowing for induced eddy currents
[ETN-91-90158] N92-12180
STATISTICAL ANALYSIS
Storm calendar 1964-1990: Chronological survey of all storms (wind force 8 and higher) along the Dutch coast in the period 1964-1990
[KNMI-176] N92-12374
A local limit theorem for L-statistics
[CWI-BS-R9033] N92-12582
Reciprocity theory of many-body interactions
[IC-AERO-90-01] N92-12620
Plasma properties
[DE90-012865] N92-12693
A statistical analysis of gamma-ray bursts detected by the Konus Experiment on Venera 11 and 12 N92-12966
STATISTICAL TESTS
Life testing and reliability with application in engineering systems
[AD-A240042] N92-12287
STEADY FLOW
Existence of three dimensional, steady, inviscid, incompressible flows with nonvanishing vorticity
[PREPRINT-1365] N92-12219
Efficient multi-dimensional upwinding for the steady Euler equations
[CWI-NM-R9107] N92-12570
STEAM
An experimental study of the volatility of ammonium chloride from aqueous solutions to high temperatures
[DE91-017875] N92-12090
Fractionation of terrestrial neon by hydrodynamic hydrogen escape from ancient steam atmospheres N92-12931
STEAM TURBINES
Strength evaluation for modified 12Cr steel and A286 steel of USC turbine rotor materials
[DE90-503033] N92-12099
STEELS
Detailed behavior of a glued double layer assembly in terms of the shearing-off of joint covers N92-12069
I.S.O. international program on the study of atmospheric corrosion: Results of first year exposure at Boucherville, October 1986 - October 1987
[NRC-28896] N92-12106
Determination of the effects of wind-induced vibration on cylindrical beams
[NASA-TM-103824] N92-12300
STELLAR ENVELOPES
Nearby main sequence stars with cool circumstellar material N92-12904
STELLAR EVOLUTION
Physical observations of comets: Their composition, origin and evolution N92-12805
A guide to the use of theoretical models of the solar nebula for the interpretation of the meteoritic record N92-12912
On the evolution of pulsars N92-12935
Observing SN 1987A with the International Ultraviolet Explorer N92-12957
Close binary stars in globular clusters N92-12960
Hydrodynamic study of Supernova 1987A: The phase of a wave of cooling and recombination N92-12973
Radiation-driven evolution of low-mass x ray binaries and the formation of millisecond pulsars
[DE92-000123] N92-12975
STELLAR LUMINOSITY
X-ray observations of SS 433 and the QSO MR 2251-178 N92-12789
Optical observations of active galactic nuclei N92-12946
Cluster research with x ray observations N92-12948
X ray radiation from Supernova 1987A. The results of the Kvant module in 1987-1989 N92-12970
STELLAR MAGNETIC FIELDS
Manifestations of dynamo driven large-scale magnetic field in accretion disks of compact objects N92-12940
Generation of ultrahigh-energy gamma rays in accreting x ray pulsars N92-12950
STELLAR MAGNETOSPHERES
Neutron starquake model for gamma-ray bursts N92-12938
STELLAR MASS
Radial velocity detection of extra-solar planetary systems N92-12806
Solar-geophysical data number 561, May 1991. Part 2: (Comprehensive reports): Data for November 1990 and miscellaneous
[PB91-217349] N92-12981
STELLAR MASS ACCRETION
Neutron starquake model for gamma-ray bursts N92-12938
Manifestations of dynamo driven large-scale magnetic field in accretion disks of compact objects N92-12940
On the observational appearances of a freely precessing neutron star in Hercules X-1 N92-12963
STELLAR MODELS
The companion object to HD114762 N92-12865
On the evolution of pulsars N92-12935
Neutron starquake model for gamma-ray bursts N92-12938
The shock breakout in SN1987A modelled with the time-dependent radiative transfer N92-12939
On the nature of pulsar radiation N92-12956
STELLAR OCCULTATION
Occultation studies of the solar system N92-12810
Interiors and atmospheres of the outer planets N92-12821
Occultation studies of the solar system N92-12834
Stellar occultations by planetary rings: 3 July 1989 28 SGR occultation by Saturn N92-12838
Probing Titan's atmosphere with a stellar occultation N92-12871
STELLAR ORBITS
The companion object to HD114762 N92-12865
Regular variability of the shape of the primary minimum of the orbital light curve of SS 433 with the phase of the precessional period N92-12942
STELLAR OSCILLATIONS
Quasi-periodic oscillations in low-mass x ray binaries N92-12958
STELLAR RADIATION
On the nature of pulsar radiation N92-12956
STELLAR ROTATION
The spin down of the radio pulsars: Braking index N92-12936
On the observational appearances of a freely precessing neutron star in Hercules X-1 N92-12963
STELLAR SPECTRA
Galileo-related ground-based observations of the Jovian System N92-12798
Physical observations of comets: Their composition, origin and evolution N92-12805
Spectroscopic planetary detection N92-12808
Studies of thermal wave phenomena on the Jovian planets N92-12809
The radial velocity search for extrasolar planets N92-12832
The companion object to HD114762 N92-12865
Optical observations of active galactic nuclei N92-12946
Gravitational lenses: The current sample, recent results, and continuing searches N92-12953
Observing SN 1987A with the International Ultraviolet Explorer N92-12957
STELLAR SPECTROPHOTOMETRY
Observing SN 1987A with the International Ultraviolet Explorer N92-12957
A study of the temporal behavior of the vertical structure of Jupiter's atmosphere N92-12976
STELLAR WINDS
On two-dimensional relativistic stellar winds N92-12947
STELLARATORS
Papers presented at Seventh International Workshop on Stellarators
[DE90-625560] N92-12698
STERILIZATION
An evaluation of the potential of combination processes involving heat and irradiation for food preservation
[DE91-638734] N92-12423
STIFFNESS
Stiffness control of teleoperators with redundant, dissimilar kinematics
[DE90-011642] N92-12265
Variable impedance journal bearings for rotor-bearing systems N92-12270
STIRLING CYCLE
Trends in dish-Stirling solar receiver designs
[DE90-011507] N92-12324
STIRLING ENGINES
Hardware development and initial subassembly test of a gas-fired Stirling/Rankine residential heat pump
[DE90-012203] N92-12194
STOCHASTIC PROCESSES
Stochastic and collisional diffusion in two-dimensional periodic flows
[DE90-014335] N92-12198
Solving stochastic linear programs on a hypercube multicomputer
[AD-A240630] N92-12472
Semi-stochastic approximation by the Response Surface Methodology (RSM)
[ETN-91-90210] N92-12581
Optimal stochastic control of multirate sampled-data systems
[REPT-90-019] N92-12586
STOICHIOMETRY
Stoichiometry and irradiation effects in melt grown Tl-Ca-Ba-Cu-O single crystals
[DE90-013365] N92-12749
STOKES LAW (FLUID MECHANICS)
Time stepping procedures for the nonstationary Stokes equations
[PREPRINT-1353] N92-12217
STORAGE RINGS (PARTICLE ACCELERATORS)
Ion stability in bunched electron beams
[DE90-014087] N92-12611
STORAGE STABILITY
Development of a non-propagating explosives storage cabinet
[DE91-017923] N92-12148
STORAGE TANKS
Environmental projects. Volume 13: Underground storage tanks, removal and replacement. Goldstone Deep Space Communications Complex
[NASA-CR-189030] N92-12035
STORMS
Storm on Saturn N92-12877
STORMS (METEOROLOGY)
Storm calendar 1964-1990: Chronological survey of all storms (wind force 8 and higher) along the Dutch coast in the period 1964-1990
[KNMI-176] N92-12374
STRAIN ENERGY RELEASE RATE
Dynamic delamination crack propagation in a graphite/epoxy laminate
[NASA-CR-187226] N92-12063
STRAIN RATE
Creep in L1(2)-intermetallics
[DE91-018231] N92-12112
Numerical simulation of plasticity at high strain rate
[DE91-011403] N92-12314
STRANGENESS
Strangeness production at 200 GeV/Nucleon
[DE92-000259] N92-12646
STRATIFICATION
Heat transfer between stratified liquids with bubbling across the interface
[DE90-008579] N92-12192
STRATOSPHERE
Extended range forecast of Atlantic seasonal hurricane activity for 1992 N92-12377
Studies of thermal wave phenomena on the Jovian planets N92-12809
Ethylene line emission from the North Pole of Jupiter N92-12876
STREPTOMYCETES
A molecular analysis of beta-lactamases and their promotors in Streptomyces
[FOA-B-40392-4.4] N92-12393
Beta-lactamase genes of Streptomyces badius, Streptomyces cacaoi and Streptomyces fradiae: Cloning and expression in Strepotomyces lividans N92-12394
Molecular analysis of beta-lactamases from four species of Streptomyces: Comparison of amino acid sequences with those of other beta-lactamases N92-12395
Transcriptional induction of Streptomyces cacaoi beta-lactamase by a beta-lactam compound N92-12396
Mutagenic analysis of the S. fradiae beta-lactamase promoter N92-12397
Chromogenic identification of promoters in Streptomyces lividans by using an ampC beta-lactamase promoter-probe vector N92-12398
STRESS ANALYSIS
An experimental and computational investigation of an annular reverse-flow combustor
[UTIAS-338] N92-11996
Numerical verification of NISA 2 finite element analysis of the cracked 5th stage compressor disc of J-85 jet engine
[NRC-LTR-ST-1792] N92-11997
Fatigue crack propagation rates of experimental aluminum lithium sheet and plate alloys
[ESDU-91015] N92-12102
Photoelastic coating method strain survey of cruciform specimen
[NRC-LTR-ST-1747] N92-12123
High explosives skid impact initiation study
[DE90-011266] N92-12133
Advanced study in solid transport: Rheological behavior of dense suspension
[DE90-009025] N92-12196
A review of aeronautical fatigue investigations in Sweden during the period May 1989 to April 1991
[FFA-TN-1991-24] N92-12313
Numerical simulation of plasticity at high strain rate
[DE91-011403] N92-12314
Strengthening of composites by internal stresses: Determination by neutron diffraction
[DE91-018549] N92-12756

STRESS CORROSION
Corrosion under stress of AISI 304 steel in thiocyanate solutions
[DE91-631523] N92-12115
Failure analysis of turbine blades
[DE91-631513] N92-12282
STRESS CORROSION CRACKING
Metallic corrosion: Causes and case histories
[NRC-LTR-ST-1798] N92-12105
STRESS INTENSITY FACTORS
Wave propagation and scattering in layered media: Application to ultrasonic nondestructive evaluation of interfacial cracks and earthquake ground motion N92-12285
STRESS MEASUREMENT
Identification of the mechanical behavior of solid materials
[ISBN-90-386-0041-0] N92-12304
STRESS-STRAIN RELATIONSHIPS
Photoelastic coating method strain survey of cruciform specimen
[NRC-LTR-ST-1747] N92-12123
Numerical simulation of plasticity at high strain rate
[DE91-011403] N92-12314
STRETCHING
A Linear Variable Differential Transfer (LVDT) conditioner for the bundle profile monitor of AmPS
[DIGEL-1991-1] N92-12178
STRING THEORY
Bit-string scattering theory
[DE90-008013] N92-12555
The formation and evolution of domain walls N92-12965
STRUCTURAL ANALYSIS
Hierarchical controlled component synthesis of large space structures
[DE90-013476] N92-12038
Determination of the effects of wind-induced vibration on cylindrical beams
[NASA-TM-103824] N92-12300
Probabilistic Structural Analysis Methods (PSAM) for select space propulsion systems components
[NASA-CR-187199] N92-12307
A review of aeronautical fatigue investigations in Sweden during the period May 1989 to April 1991
[FFA-TN-1991-24] N92-12313
ISO optical subsystem
[REPT-911-440-115] N92-12681
Structural and optical characterisation of Langmuir-Blodgett films for data storage applications N92-12780
STRUCTURAL DESIGN
Designing equipment for use in gamma radiation environments
[DE90-012050] N92-12162
Methods for improving damping. Part 1: An introduction and guide to practical methods of increasing structural damping
[ESDU-91012-PT-1] N92-12301
Composite load spectra for select space propulsion structural components
[NASA-CR-189048] N92-12306
Optimal design of nonlinear shell structures
[FFA-TN-1991-18] N92-12312
D0 data acquisition: High speed data paths for D0
[DE90-013326] N92-12444
Optimization on AmPS chicane magnets
[NIKHEF-K-AMPS/91-02] N92-12595
STRUCTURAL DESIGN CRITERIA
Variable impedance journal bearings for rotor-bearing systems N92-12270
STRUCTURAL STABILITY
The effect of berming on the response of structures subjected to nearby detonations
[FFI-91/4005] N92-12310
STRUCTURAL VIBRATION
Vibroacoustic Payload Environment Prediction System (VAPEPS): VAPEPS management center remote access guide
[NASA-CR-189448] N92-12292
Methods for improving damping. Part 1: An introduction and guide to practical methods of increasing structural damping
[ESDU-91012-PT-1] N92-12301
SUBASSEMBLIES
Hardware development and initial subassembly test of a gas-fired Stirling/Rankine residential heat pump
[DE90-012203] N92-12194
SUBSONIC FLOW
Phenomenological modeling of the wake produced by a straight two dimensional base in subsonic flow
[REPT-90/59] N92-11982
Procedure for determination of three-dimensional wind tunnel wall interferences and wall adaptation in compressible subsonic flow using measured wall pressures
[DLR-FB-91-09] N92-12005
SULFATES
Can sulfate fluxes in forest canopy throughfall be used to estimate atmospheric sulfur deposition?
[DE92-000044] N92-12356
Carbonate and sulfate minerals in the Chassigny meteorite N92-12930
SULFATION
Reduced molybdenum oxidation states in hydrodesulfurization catalysis by Chevrel phases
[DE91-018168] N92-12092
SULFIDES
Gold sulfide replacements of cyanide solutions
[DE91-017981] N92-12111
SULFUR COMPOUNDS
Theoretical spectroscopy of comets N92-12794
SULFUR DIOXIDES
Galileo-related ground-based observations of the Jovian System N92-12798
Io's atmosphere detected by ground-based microwave spectroscopy N92-12859
SULFURIC ACID
Method for producing oxygen from lunar materials
[NASA-CASE-MSC-21759-1] N92-12079
SUN
A guide to the use of theoretical models of the solar nebula for the interpretation of the meteoritic record N92-12912
SUNLIGHT
Spectroscopic planetary detection N92-12808
SUPERCOMPUTERS
Los Alamos National Laboratory's high-performance data system
[DE92-000223] N92-12442
Requirements for a network storage service in a supercomputer environment
[DE92-000245] N92-12513
SUPERCONDUCTING FILMS
Properties of epitaxial YBa2Cu3O(7-delta)-based superconducting superlattices
[DE92-000423] N92-12765
SUPERCONDUCTING MAGNETS
Computation of magnetic suspension of maglev systems using dynamic circuit theory
[DE91-017973] N92-12280
An update on passive correctors for the SSC dipole magnets
[DE92-000649] N92-12669
The need for superconducting magnets for MHD seawater propulsion
[DE90-013651] N92-12705
SUPERCONDUCTING SUPER COLLIDER
Identifying the origin of new gauge bosons at the SSC and LHC
[DE92-000290] N92-12648
First order tune shift calculations for transverse betatron dynamics
[DE92-000370] N92-12668
An update on passive correctors for the SSC dipole magnets
[DE92-000649] N92-12669
Magnetic field in the SSC arc quad
[DE92-000656] N92-12670
SUPERCONDUCTIVITY
Principles of superconductor imaging surface gradiometry
[DE90-008916] N92-12740
The performance of a superconducting micro-undulator prototype
[DE90-012639] N92-12743
Theory of exotic superconducting and normal states of heavy electron and high T(sub c) materials
[DE90-012688] N92-12745
Superconducting La2CuO(4+x) prepared by oxygenation at high pressure: A Raman scattering study
[DE90-012915] N92-12747
Phase diagram of anisotropic two-dimensional quarter-filled band of interacting electrons
[DE90-013171] N92-12748
Stoichiometry and irradiation effects in melt grown Tl-Ca-Ba-Cu-O single crystals
[DE90-013365] N92-12749
Properties of epitaxial YBa2Cu3O(7-delta)-based superconducting superlattices
[DE92-000423] N92-12765
SUPERCONDUCTORS
Principles of superconductor imaging surface gradiometry
[DE90-008916] N92-12740
Evidence of weak pair coupling in the penetration depth of bi-based high-Tc superconductors
[DE90-009415] N92-12741
Phase diagram of anisotropic two-dimensional quarter-filled band of interacting electrons
[DE90-013171] N92-12748
Magnetization studies of irradiation modified single crystal Y1Ba2Cu3O7 superconductors: Flux creep and annealing effects
[DE91-018858] N92-12758
SUPERHEATING
Evaluation of the fabricability of advanced austenitic tubing
[DE91-017158] N92-12109
SUPERHIGH FREQUENCIES
Arecibo S-band radar program N92-12803
SUPERLATTICES
Properties of epitaxial YBa2Cu3O(7-delta)-based superconducting superlattices
[DE92-000423] N92-12765
Laser ablation synthesis and properties of epitaxial YBa2Cu3O(7-delta) / PrBa2Cu3O(7-delta) superconducting superlattices
[DE92-000447] N92-12766
SUPERNOVA REMNANTS
Axially symmetrical supernova remnants N92-12937
SUPERNOVA 1987A
Instabilities in SN1987A and other supernovae N92-12934
The shock breakout in SN1987A modelled with the time-dependent radiative transfer N92-12939
Observing SN 1987A with the International Ultraviolet Explorer N92-12957
X ray radiation from Supernova 1987A. The results of the Kvant module in 1987-1989 N92-12970
Hydrodynamic study of Supernova 1987A: The phase of a wave of cooling and recombination N92-12973
SUPERNOVAE
Cs-135 - Ba-135: A new cosmochronometric constraint on the origin of the Earth and the astrophysical site of the origin of the solar system N92-12915
Instabilities in SN1987A and other supernovae N92-12934
The evolution of the gravitational radiation from stellar components of galaxies N92-12959
Nucleosynthetic gamma ray lines and positrons from supernovae N92-12983
SUPERSONIC FLOW
Over forty years of continuous research at UTIAS on nonstationary flows and shock waves
[UTIAS-50] N92-11974
Compression ramp in rarefied gas
[RC-90-08] N92-11978
CARS temperature measurements in a hypersonic propulsion test facility N92-12049
Nitrogen dioxide fluorescence following photolysis in a supersonic jet
[DE90-014164] N92-12078
SUPERSONIC SPEED
Pitching moment derivative due to rate of pitch for projectiles at supersonic speeds
[ESDU-91004] N92-11967
Lift-curve slope of wing-body combinations
[ESDU-91007] N92-11968
SUPERSYMMETRY
Physical interpretation of supercoherent states and their associated Grassmann numbers
[DE92-000187] N92-12770
SUPPORT SYSTEMS
Space shuttle Mission Control Center upgrade N92-12015
Control center operations at the Goddard Space Flight Center N92-12023
Lessons learned in control center technologies and non-technologies N92-12026
Decision support system development using a migration approach
[DE91-018860] N92-12774
SURFACE CRACKS
Cryogenic testing of fluoropolymer-coated stainless steel tubing
[DE90-008022] N92-12098
SURFACE FINISHING
The EDM surface: Topography, chemistry, and metallurgy
[DE91-017756] N92-12110
SURFACE PROPERTIES
The stability of graphite brushes at high velocity
[ETN-91-90176] N92-12184
Heat-transfer material
[DE91-017723] N92-12221
SURFACE ROUGHNESS EFFECTS
Microwave remote sensing and radar polarization signatures of natural fields
[NASA-CR-189249] N92-12317
SURFACE TEMPERATURE
Incipient boiling in microgravity N92-12140

Estimation of surface heat and moisture fluxes over a prairie grassland using a hybrid biosphere/remote sensing model N92-12320

SURFACE TREATMENT
Development of surface treatments and alloy modifications for corrosion-resistant oxide scales [DE90-012723] N92-12097

SURFACE VEHICLES
A method of computing smooth transitions between a sequence of straight line paths for an autonomous vehicle [NRC-31776] N92-12547

SURFACTANTS
Periodically structured multiphase flows and hydrodynamic instabilities in narrow capillaries [DE91-018802] N92-12223

SURGES
Sandia severe electrostatic discharge tester: Version 3 (SSET), serial number 1 [DE91-018582] N92-12243

SURVEILLANCE
Unattended optical surveillance equipment [DE90-013403] N92-12228

SURVEYS
Storm calendar 1964-1990: Chronological survey of all storms (wind force 8 and higher) along the Dutch coast in the period 1964-1990 [KNMI-176] N92-12374
Survey on possibility to utilize effectively underground space [DE92-703044] N92-12417
A survey of available tools and methods for software requirements capture and design N92-12450
Palomar Planet-Crossing Asteroid Survey (PCAS) N92-12819

SURVIVAL
Characterization of a rotating drum for long term studies of aerosols [FOA-C-40261-4.5] N92-12399

SUSPENDING (MIXING)
Advanced study in solid transport: Rheological behavior of dense suspension [DE90-009025] N92-12196

SWEPTBACK TAIL SURFACES
Effect of twin fins on isolated tailplane lift-curve slope [ESDU-91009] N92-11969

SWIRLING
An experimental analysis of lateral jet injection into confined swirling crossflows N92-12199

SWITCHES
Characterization and development report for the 381558 [DE90-010395] N92-12161
The repetitive high energy pulsed power module [DE90-013076] N92-12164
Channel cooling-techniques for repetitively pulsed magnetic switches [DE90-013077] N92-12165
Calculated non-linear magnetic field penetration of plasma opening switches [DE90-013156] N92-12166
Tests on photoconductive semiconductor switches for subnanosecond risetime, multimegavolt pulser applications [DE91-018797] N92-12190

SWITCHING CIRCUITS
Recovery of high field GaAs photoconductive semiconductor switches [DE90-013062] N92-12163

SYMBOLS
Joint carrier phase estimation and symbols decoding of trellis codes [TELECOM-PARIS-91-C-003] N92-12473

SYMMETRY
Axially symmetrical supernova remnants N92-12937

SYNCHRONISM
Synchronization of parallel processes by hardware: Realizations in asynchronous technique [ETN-91-90164] N92-12509

SYNCHRONOUS SATELLITES
A differential charging model for synchronous satellites N92-12041

SYNCHROTRON RADIATION
Nonthermal synchrotron pair cascades in strong magnetic fields: A gamma ray burst emission model N92-12899

SYNTAX
The syntax and semantics of micro CRL [CWI-CS-R9076] N92-12480

SYNTHESIS (CHEMISTRY)
Chemically modified polymeric resins for high performance liquid chromatography, solid-phase extraction, and organic separation by LC and GC [DE91-018166] N92-12130
Probe molecule studies: Active species in alcohol synthesis [DE92-000332] N92-12138

SYNTHETIC APERTURE RADAR
SAR data compression: Application, requirements, and designs N92-12428

SYNTHETIC APERTURES
The sensitivity of synthetic aperture radiometers for remote sensing applications from space [NASA-TM-100741] N92-12321

SYSTEM FAILURES
Ejection systems and the human factor: A guide for flight surgeons and aeromedical trainers [DCIEM-88-TR-16] N92-11986
Diagnostic reasoning techniques for selective monitoring [NASA-CR-189446] N92-12549

SYSTEM IDENTIFICATION
Identification of the mechanical behavior of solid materials [ISBN-90-386-0041-0] N92-12304

SYSTEMS ANALYSIS
Networking as a Strategic Tool, 1991 [NASA-CR-188124] N92-12497
Analysis and optimization of polling systems [CWI-BS-R9102] N92-12548

SYSTEMS COMPATIBILITY
Constraint propagation through electromagnetic interaction topologies [NRC-31761] N92-12154

SYSTEMS ENGINEERING
SHARP: Spacecraft Health Automated Reasoning Prototype N92-12020
Lawrence Livermore National Laboratory Underwater Laser Imaging System (UWLIS) development project [DE91-019001] N92-12258
NASA reliability preferred practices for design and test [NASA-TM-4322] N92-12286
Machine intelligence for survivable communications network management N92-12518
Spacecraft electrical power system fault detection/diagnosis and resource management N92-12523
TACAID: A knowledge based system for tactical decision making N92-12524
Decision support system development using a migration approach [DE91-018860] N92-12774
Results and the future of research, part 2 [DE90-503494] N92-12987

SYSTEMS INTEGRATION
Evaluation of components, subsystems, and networks for high rate, high frequency space communications [NASA-TM-105274] N92-12151
Helmet mounted sight and display testing [MBB-UD-0594-91-PUB] N92-12421
Helicopter integrated helmet requirements and test results [MBB-UD-0595-91-PUB] N92-12422
A synergistic approach to reasoning for autonomous satellites N92-12522
Decision support system development using a migration approach [DE91-018860] N92-12774

T

T TAURI STARS
Infrared speckle interferometry and spectroscopy of Io N92-12820

T-33 AIRCRAFT
Flight Research Laboratory T-33 microgravity facility flight operations, 1986 to 1990 [NRC-32136] N92-12142

TAIL ASSEMBLIES
Effect of twin fins on isolated tailplane lift-curve slope [ESDU-91009] N92-11969
Compression ramp in rarefied gas [RC-90-08] N92-11978
Tutor aft fuselage and empennage full-scale fatigue test: Resolution of horizontal stabilizer installation difficulties [NRC-LTR-ST-1804] N92-11990

TAPES
Heat-transfer material [DE91-017723] N92-12221

TARGETS
Toward the optimisation of passive ground targets in spaceborne laser ranging [REPT-911-440-112] N92-12256
Determination of the contact forces between a projectile and a hard target [DE91-018354] N92-12281

TAYLOR INSTABILITY
Richtmyer-Meshkov instability of shocked gaseous interfaces [DE92-000308] N92-12225
Instabilities in SN1987A and other supernovae N92-12934

TEARING MODES (PLASMAS)
Soft x-ray measurement of internal tearing mode structure in a reversed-field pinch [DE92-000164] N92-12729

TECHNOLOGY ASSESSMENT
Advanced laptop and small personal computer technology N92-12029
Mission critical technology development N92-12031
A summary of the status of biomass conversion technologies and opportunities for their use in Latin America [DE90-012284] N92-12328
Vertical integration of science, technology, and applications [DE90-013552] N92-12344
An independent review of the Multi-Path Redundant Avionics Suite (MPRAS) architecture assessment and characterization report [NASA-CR-188126] N92-12440
Recent progress in the development of materials for fusion reactors [DE91-016283] N92-12722
An overview of realtime expert systems [NRC-31759] N92-12783
Results and the future of research, part 2 [DE90-503494] N92-12987

TECHNOLOGY TRANSFER
Mission critical technology development N92-12031
Future applications of artificial intelligence to Mission Control Centers N92-12032

TECHNOLOGY UTILIZATION
Advanced technologies for Mission Control Centers N92-12028
MOD control center automated information systems security evolution N92-12030
Mission critical technology development N92-12031
Future applications of artificial intelligence to Mission Control Centers N92-12032
A summary of the status of biomass conversion technologies and opportunities for their use in Latin America [DE90-012284] N92-12328
Vertical integration of science, technology, and applications [DE90-013552] N92-12344
Data compression for near Earth and deep space to Earth transmission N92-12432

TELECOMMUNICATION
Supervisory autonomy in telerobotics [NRC-31743] N92-12546

TELECONFERENCING
Computer conferencing: Choices and strategies N92-12503

TELEMETRY
B-2 and other current flight test control center system architectures N92-12011
AFSCN command and control segment evolution N92-12017
Planning systems for pioneer mission control N92-12021
Scientific requirements for space science data systems N92-12429
Formal specification of satellite telemetry: A practical experience N92-12456

TELEOPERATORS
Stiffness control of teleoperators with redundant, dissimilar kinematics [DE90-011642] N92-12265
Autonomous trajectory generation for mobile robots with non-holonomic and steering angle constraints [DE90-012298] N92-12268
Planning and reasoning in the JPL telerobot testbed [NASA-CR-189038] N92-12278

TELESCOPES
ISO optical subsystem [REPT-911-440-115] N92-12681
Operation of the University of Hawaii 2.2M telescope on Mauna Kea N92-12814
Imaging studies of comets N92-12836

TEMPERATURE CONTROL
Maintaining optimum light output with a thermally conductive heat pipe [DE90-012423] N92-12195

TEMPERATURE DEPENDENCE
Error analysis by numerical simulation for a three-color pyrometer assuming a blackbody spectrum and a wavelength and temperature dependent emissivity [DE90-011504] N92-12230

Properties of liquid water and carbon dioxide from constant pressure-constant temperature molecular dynamics
[DE91-018219] N92-12633
TEMPERATURE EFFECTS
Thermal design and test results for SUNLITE ultra-stable reference cavity
[NASA-TM-104117] N92-12045
A damage tolerance assessment of bonded repairs to CF-18 composite components. Part 1: Adhesive properties
[DREP-TM-88-25-PT-1] N92-12060
Development of surface treatments and alloy modifications for corrosion-resistant oxide scales
[DE90-012723] N92-12097
Cryogenic testing of fluoropolymer-coated stainless steel tubing
[DE90-008022] N92-12098
Creep in L1(2)-intermetallics
[DE91-018231] N92-12112
The effect of casting temperature on the fatigue properties of cast nickel aluminide alloys
[DE92-000432] N92-12118
Ultrasonic investigation of amorphous polymers (polystyrene) in a wide range of temperature and pressure. 1: Introduction, method, technique, and results
[NRC-29718] N92-12125
Channel cooling-techniques for repetitively pulsed magnetic switches
[DE90-013077] N92-12165
Cathode applications to high-current diodes
[DE90-013290] N92-12172
Error analysis of a ratio pyrometer by numerical simulation
[DE90-011500] N92-12229
Development of atmospheric diffusion evaluation method incorporating thermal and topographical effects. Part 2: A literature review of turbulence model under topographical condition
[DE90-503795] N92-12345
Workshop on High Heat Load X Ray Optics
[DE90-011799] N92-12673
Effect of cooling rate on the transition temperature in Bi-Pb-Sr-Ca-Cu-O system
[DE91-628643] N92-12762
TEMPERATURE GRADIENTS
Heat transfer between stratified liquids with bubbling across the interface
[DE90-008579] N92-12192
Estimation of surface heat and moisture fluxes over a prairie grassland using a hybrid biosphere/remote sensing model N92-12320
Measurement of magnetic fluctuations at small spatial scales in the Tokapole 2 tokamak
[DE92-000161] N92-12728
TEMPERATURE MEASUREMENT
CARS temperature measurements in a hypersonic propulsion test facility N92-12049
Incipient boiling in microgravity N92-12140
Thermal analysis report of the SANDAC V processor module
[DE91-018889] N92-12191
TEMPORAL RESOLUTION
Long term changes in reflectivity and large scale motions in the atmosphere of Jupiter and Saturn N92-12795
Arecibo S-band radar program N92-12803
TENSILE PROPERTIES
Designing precipitation-strengthened iron-aluminides for high-temperature applications
[DE90-013832] N92-12100
TENSILE STRENGTH
Influences of expanding monomer on carbon fiber reinforced epoxy composites 2
[AD-A240583] N92-12057
Tensile properties of injection molded long fiber thermoplastic composites
[NRC-29456] N92-12062
Spatial variability in the tensile strength of an extruded nuclear-grade graphite
[DE91-018868] N92-12070
TENSOR ANALYSIS
Concept lattices with anti-endomorphism
[ETN-91-90182] N92-12594
TERMINOLOGY
Compendium of MHD-related terminology
[DE90-012867] N92-12699
TERRAIN
A concept for treating dense-gas dispersion under realistic conditions of terrain and variable winds
[DE90-012892] N92-12343
TEST EQUIPMENT
Ames life science telescience testbed evaluation
[NASA-CR-188856] N92-12033
A distributed environment for testing cooperating expert systems N92-12519
TEST FACILITIES
Fuel flow measurement in gas turbine testing
[NRC-29808] N92-12000
A derivation of gross thrust for a sea-level jet engine test cell
[NRC-30165] N92-12001
NASA Ames-Dryden integrated test facility: Presentation outline N92-12014
Optical studies in the holographic ground station
[NASA-CR-184257] N92-12239
THEOREMS
On the limitations of Froude's actuator disc concept
[ETN-91-90136] N92-11973
Central limit theorem for non-homogeneous processes with independent increments and semimarkov switchings
[CWI-AM-R9026] N92-12564
A local limit theorem for L-statistics
[CWI-BS-R9033] N92-12582
Tait's flyping conjecture for well-connected links
[CWI-BS-R9037] N92-12584
CEPA-type size consistency corrections for MRSDCI calculations, MRCEPA N92-12631
THEORETICAL PHYSICS
Research in elementary particle physics
[DE90-013443] N92-12604
Theoretical nuclear physics
[DE92-000022] N92-12615
THERMAL ANALYSIS
Thermal analysis report of the SANDAC V processor module
[DE91-018889] N92-12191
ISO optical subsystem
[REPT-911-440-115] N92-12681
THERMAL BATTERIES
Thermal battery statistics and plotting programs
[DE90-013873] N92-12170
THERMAL COMFORT
Air movement, comfort and ventilation in workstations
[DE92-000667] N92-12424
THERMAL CONDUCTIVITY
Thermal conductivity of gaseous halogenated hydrocarbons
[ESDU-91005] N92-12080
THERMAL DIFFUSIVITY
Fluid oscillations and enhanced heat transfer in a parallel plate channel bounded by end reservoirs maintained at different temperature N92-12202
THERMAL EMISSION
Nonthermal synchrotron pair cascades in strong magnetic fields: A gamma ray burst emission model N92-12899
THERMAL ENERGY
Production of desalinated water using ocean thermal energy
[DE91-018894] N92-12336
THERMAL ENVIRONMENTS
Thermal design and test results for SUNLITE ultra-stable reference cavity
[NASA-TM-104117] N92-12045
THERMAL EXPANSION
A process for preparing an assembly of an article and a soluble polyimide which resists dimensional change, delamination, and debonding when exposed to changes in temperature
[NASA-CASE-LAR-14763-1] N92-12121
THERMAL NOISE
Vacuum-isolation vessel and method for measurement of thermal noise in microphones
[NASA-CASE-LAR-14567-1-CU] N92-12174
THERMAL PLASMAS
Phenomenology, diagnostics, and non-LTE effects in plasma-particle interactions
[DE90-013088] N92-12701
THERMAL RADIATION
Studies of thermal wave phenomena on the Jovian planets N92-12867
THERMAL RESISTANCE
Incipient boiling in microgravity N92-12140
THERMAL STABILITY
Thermal design and test results for SUNLITE ultra-stable reference cavity
[NASA-TM-104117] N92-12045
THERMAL VACUUM TESTS
Thermal design and test results for SUNLITE ultra-stable reference cavity
[NASA-TM-104117] N92-12045
THERMOCHEMISTRY
Current programmes of Metallurgy Division, 1991
[DE91-634904] N92-12104
THERMOCOUPLES
Thermal analysis report of the SANDAC V processor module
[DE91-018889] N92-12191
THERMODYNAMIC CYCLES
Compendium of MHD-related terminology
[DE90-012867] N92-12699
Magnetohydrodynamic projects at the CDIF
[DE92-000396] N92-12735
THERMODYNAMIC EQUILIBRIUM
The state variable method as a unifying approach to the study of semiconductor devices
[REPT-90-045] N92-12187
THERMODYNAMIC PROPERTIES
Heat transfer and instrumentation studies on rotating turbine blades in a transient facility N92-12203
Simultaneous determination of optical and thermodynamic properties of an evaporating aqueous solution droplet
[DE90-010652] N92-12767
The thermodynamic properties of benzothiazole and benzoxazole
[DE91-002250] N92-12769
THERMODYNAMICS
A database for the Geysers geothermal field
[DE90-013811] N92-12330
THERMOELECTRIC GENERATORS
Uncertainty analysis report for Ulysses, volume 1
[DE91-013476] N92-12039
Safety Evaluation Report for Ulysses, volume 2
[DE91-013475] N92-12040
Safety Evaluation Report for Ulysses, volume 1
[DE91-013473] N92-12047
Centaur in-tank explosion flow fields within STS and Titan 4 payload spaces
[NASA-CR-189039] N92-12144
THERMOGRAPHY
Thermographic gust wind tunnel measurements
[ONERA-RF-31/3409-PY] N92-11972
Nondestructive testing of sandwich structures
[REPT-911-430-137] N92-12066
Inspection of materials and structures by infrared thermography: Signal processing techniques for defect enhancement and characterization
[NRC-29717] N92-12291
THERMOMETERS
Thermal effects on the Josephson series-array voltage standard
[DE90-008738] N92-12160
Developments and directions in 200 MHz very high power RF at LAMPF
[DE92-000175] N92-12667
THERMOPHYSICAL PROPERTIES
Thermophysical properties of nitrous oxide
[ESDU-91022] N92-12082
The thermodynamic properties of benzothiazole and benzoxazole
[DE91-002250] N92-12769
THERMOSETTING RESINS
Modelling the cure of Narmco 5208: A method for determining the chemical state of the prepreg
[NRC-29449] N92-12126
THICKNESS
Interface effects and fracture in Nicalon/SiC composites
[DE90-012925] N92-12055
THIN FILMS
Application of parallel computing to the Monte Carlo simulation of electron scattering in solids: A rapid method for profile deconvolution
[DE90-009322] N92-12072
Controlled microstructure oxide coating for chemical sensors
[DE90-012223] N92-12119
Recent (e,2e) studies: Laser excited atoms, autoionization, Auger processes, and thin films
[DE91-634156] N92-12614
Laser conditioning of optical thin films
[DE90-013483] N92-12672
Large area laser conditioning of dielectric thin film mirrors
[DE90-013485] N92-12674
Photon enhanced chemical vapor deposition of carbon based thin films from toluene vapor N92-12720
A system to deposit boron films (boronization) in the D3-D tokamak
[DE92-000288] N92-12733
The role of inhibitors during electrodeposition of thin metallic films
[DE90-014177] N92-12750
Piezoelectric devices using sol gel thin films
[NRC-31370] N92-12751
Structural and optical characterisation of Langmuir-Blodgett films for data storage applications N92-12780
THOMSON SCATTERING
The multipulse Thomson scattering diagnostic on the D3-D tokamak
[DE92-000262] N92-12732

THREAT EVALUATION
Automated threat response recommendation in environments of high data uncertainty using the Countermeasure Association Technique (CMAT) N92-12525
Adaptive tactical navigation program N92-12529
THREE BODY PROBLEM
Reciprocity theory of many-body interactions [IC-AERO-90-01] N92-12620
THREE DIMENSIONAL FLOW
Procedure for determination of three-dimensional wind tunnel wall interferences and wall adaptation in compressible subsonic flow using measured wall pressures [DLR-FB-91-09] N92-12005
Existence of three dimensional, steady, inviscid, incompressible flows with nonvanishing vorticity [PREPRINT-1365] N92-12219
Three dimensional shallow water model on the Cray Y-MP4/464 [CWI-NM-R9106] N92-12487
THREE DIMENSIONAL MODELS
Three-dimensional particle-in-cell modeling of relativistic electron beam production and transport for KrF laser pumping [DE90-013050] N92-12247
Three-dimensional elastodynamic modeling and analysis of a flexible robot manipulator N92-12271
Three-dimensional forecasting models on a desk-top computer [DE90-010612] N92-12347
Computer aided modelization of ribosomic data [ETN-91-90161] N92-12391
Direct estimation of deformable motion parameters from a range image sequence [NRC-31757] N92-12476
Three dimensional shallow water model on the Cray Y-MP4/464 [CWI-NM-R9106] N92-12487
Recognition of three dimensional shapes: Application to chemical molecules [TELECOM-PARIS-90-E-018] N92-12613
A three-dimensional model for molecular cloud collapse and protostellar formation N92-12898
THRESHOLD VOLTAGE
The energy complexity of threshold and other functions (preliminary version) [CWI-CS-R9101] N92-12186
THRUST CONTROL
Application of Eigenstructure Assignment to the control of powered lift combat aircraft [RAE-TM-FS-1009] N92-12004
THRUST MEASUREMENT
A derivation of gross thrust for a sea-level jet engine test cell [NRC-30165] N92-12001
THRUSTORS
The need for superconducting magnets for MHD seawater propulsion [DE90-013651] N92-12705
THULIUM ISOTOPES
Thulium heat source for high-endurance and high-energy density power systems [DE91-018991] N92-12666
TILT ROTOR AIRCRAFT
Flow visualization and flow field measurements of a 1/12 scale tilt rotor aircraft in hover [NASA-CR-189456] N92-11983
TIME DEPENDENCE
Characterization of a rotating drum for long term studies of aerosols [FOA-C-40261-4.5] N92-12399
Local uniform grid refinement for time-dependent partial differential equations [CWI-NM-R9105] N92-12569
Solving the discretized time-independent Schroedinger equation in the Lanczos procedure N92-12630
TIME FUNCTIONS
Time-reversion of a hybrid state stochastic difference system [NLT-TP-89014-U] N92-12585
TIME LAG
Time delay and finite differences for the nonstationary nonlinear Navier-Stokes equations [PREPRINT-1359] N92-12218
TIME MARCHING
Time stepping procedures for the nonstationary Stokes equations [PREPRINT-1353] N92-12217
TIME MEASUREMENT
Basic physics and cosmology from pulsar timing data N92-12971
TIME SERIES ANALYSIS
Precise relative sea surface positioning of a floating platform using the Global Positioning System (GPS) N92-11987
Comments on: Stabilizability and detectability of discrete-time time-varying systems [REPT-90-014] N92-12571
A minimum prediction error algorithm for estimation of periodic ARMA models [REPT-90-016] N92-12573
On the convergence to the strong solution of periodic Riccati equations [REPT-90-021] N92-12575
Optimal stochastic control of multirate sampled-data systems [REPT-90-019] N92-12586
TIME SHARING
Computer conferencing: Choices and strategies N92-12503
TITAN
Infrared variability of Jupiter and Saturn N92-12825
Probing Titan's atmosphere with a stellar occultation N92-12871
TITANIUM ALLOYS
Synthesis of Al/Al3Ti two-phase alloys by mechanical alloying [DE92-000193] N92-12117
TITANIUM COMPOUNDS
Compaction of TiH(1.65)/KClO4 pyrotechnic powder during confined burn [DE90-013199] N92-12136
TOKAMAK DEVICES
Finite orbit energetic particle linear response to toroidal Alfven Eigenmodes [DE91-018418] N92-12612
Physics study of the application of an IFEL (Induction Free Electron Laser) to CIT (Compact Ignition Tokamak) [DE90-011276] N92-12690
MTX (Microwave Tokamak Experiment) data acquisition and analysis computer network [DE90-013066] N92-12694
MTX (Microwave Tokamak Experiment) diagnostics and timing system for FEL (Free Electron Laser) heating experiments [DE90-013067] N92-12695
West European magnetic confinement fusion research [DE90-010911] N92-12704
Total magnetic reconnection during a tokamak major disruption [DE90-014711] N92-12706
Magnetic field structure near the plasma boundary in helical systems and divertor tokamaks [NIFS-17] N92-12708
Reflectometry and transport in thermonuclear plasmas in the joint European Torus [ETN-91-90135] N92-12709
Studies of fine structure of discharge region on HT-6B tokamak device [DE91-628421] N92-12723
Plasma electron density measurement with multichannel microwave interferometer on the HL-1 tokamak device [DE91-628422] N92-12724
HL-1 tokamak data acquisition system and its initial application in the physical experiment [DE91-630701] N92-12725
Full-wave calculation of fast-wave current drive in tokamaks including k(sub (parallel)) upshifts [DE92-000048] N92-12726
Measurement of magnetic fluctuations at small spatial scales in the Tokapole 2 tokamak [DE92-000161] N92-12728
The multipulse Thomson scattering diagnostic on the D3-D tokamak [DE92-000262] N92-12732
A system to deposit boron films (boronization) in the D3-D tokamak [DE92-000288] N92-12733
Inductive currents in an RF driven plasma [DE92-000491] N92-12738
TOLERANCES (PHYSIOLOGY)
A molecular analysis of beta-lactamases and their promotors in Streptomyces [FOA-B-40392-4.4] N92-12393
TOOLS
Electroless vs electrodeposited Ni-P alloys for diamond turning applications [DE91-018999] N92-12113
TOPOGRAPHY
The EDM surface: Topography, chemistry, and metallurgy [DE91-017756] N92-12110
Development of atmospheric diffusion evaluation method incorporating thermal and topographical effects. Part 2: A literature review of turbulence model under topographical condition [DE90-503795] N92-12345
Contents of the JPL Distributed Active Archive Center (DAAC) archive, version 2-91 [NASA-CR-189027] N92-12784
TOPOLOGY
Robustness of feedback stabilization: A topological approach [ETN-91-90142] N92-12545
TOROIDAL PLASMAS
Effect of the equilibrium magnetic field on plasma edge fluctuations [DE90-012720] N92-12692
Soft x-ray measurement of internal tearing mode structure in a reversed-field pinch [DE92-000164] N92-12729
An algorithm for determining EF coils from fixed-boundary equilibria applied to ARIES 3 [DE92-000170] N92-12730
Ground-based observations of comets, the Jupiter plasma Torus, and Io N92-12840
TORUSES
Studies of extended planetary atmospheres N92-12822
TOXIC HAZARDS
Research needs for improvement of protection against explosive or toxic industrial chemicals hazards [FOA-C-40286-4.5] N92-12147
TRACE CONTAMINANTS
Chemical analysis of trace substances from explosives [DE91-017833] N92-12084
TRACE ELEMENTS
Can sulfate fluxes in forest canopy throughfall be used to estimate atmospheric sulfur deposition? [DE92-000044] N92-12356
Microprobe studies of microtomed particles of white druse salts in shergottite EETA 79001 N92-12921
TRACKING (POSITION)
Tracking and vertex finding with drift chambers and neural networks [DE92-000472] N92-12652
TRACKING NETWORKS
AFSCN command and control segment evolution N92-12017
TRACKING PROBLEM
Tracking performance requirements for rotorcraft instrument approaches to reduced minima. Phase 1: Preliminary study [NRC-32137-PHASE-1] N92-11988
TRACKING STATIONS
AFSCN command and control segment evolution N92-12017
TRAILING EDGE FLAPS
Maximum lift of wings with trailing-edge flaps at low speeds [ESDU-91014] N92-11970
TRAINING DEVICES
The modelling of turbulence and downbursts for flight simulators [UTIAS-339] N92-12373
TRAJECTORIES
Air-breathing hypersonic vehicle guidance and control studies; An integrated trajectory/control analysis methodology: Phase 1 [NASA-CR-187623] N92-12002
MacSPOC: Orbital trajectory calculations on a laptop computer N92-12027
Hypervelocity explosive launchers [DE90-011713] N92-12036
TRAJECTORY CONTROL
Air-breathing hypersonic vehicle guidance and control studies; An integrated trajectory/control analysis methodology: Phase 1 [NASA-CR-187623] N92-12002
A unified motion planning approach for redundant and non-redundant manipulators with actuator constraints [NASA-CR-189002] N92-12274
A unified motion planning approach for redundant and non-redundant manipulators with actuator constraints [NASA-CR-189023] N92-12276
A method of computing smooth transitions between a sequence of straight line paths for an autonomous vehicle [NRC-31776] N92-12547
TRAJECTORY OPTIMIZATION
Heuristic methods for optimal trajectory planning of robotic manipulators N92-12272
Neural network solutions to mathematical models of parallel search for optimal trajectory generation N92-12527
TRAJECTORY PLANNING
Autonomous trajectory generation for mobile robots with non-holonomic and steering angle constraints [DE90-012298] N92-12268
Heuristic methods for optimal trajectory planning of robotic manipulators N92-12272
A unified motion planning approach for redundant and non-redundant manipulators with actuator constraints [NASA-CR-189002] N92-12274

A unified motion planning approach for redundant and non-redundant manipulators with actuator constraints
[NASA-CR-189023] N92-12276

TRANSDUCERS
Operations manual for reading VAK-3 ultrasonic seals using a data acquisition box
[DE90-013644] N92-12143
An experimental technique for investigation of instantaneous wall heat flux to a turbulent boundary layer in water N92-12200
Extraction apparatus with pulsed columns for monitoring dispersed phase
[DE91-017680] N92-12209

TRANSFORMATIONS (MATHEMATICS)
Three-dimensional explicit depth migration via McClellan transformations on hexagonal sampling grids
[DE91-017370] N92-12558
Descriptor representations without direct feedthrough term
[CWI-BS-R9103] N92-12563

TRANSFORMERS
High power impedance matchers with 100-ps risetime
[DE90-013516] N92-12150

TRANSISTOR CIRCUITS
V.DMOS transistor modeling for simulation of power electronic circuits
[LAAS-91711] N92-12179

TRANSISTORS
Characterization and development report for the 381558
[DE90-010395] N92-12161
The behavior and testing implications of CMOS IC logic gate open circuits
[DE91-018679] N92-12189

TRANSITION TEMPERATURE
Ductile-brittle transition temperature testing of tungsten using the three-point bend test
[DE92-000099] N92-12116
Computer modeling of arc welds to predict effects of critical variables on weld penetration
[DE92-000428] N92-12283
Specific heat of La(2-x)Sr(x)CuO4; volume fraction of superconductivity; possible structural transition at 45 K
[DE90-011585] N92-12744
Phase diagram of anisotropic two-dimensional quarter-filled band of interacting electrons
[DE90-013171] N92-12748
Forming process of 110 K high-Tc phase in Bi-Pb-Sr-Ca-Cu-O system
[DE91-628642] N92-12761
Effect of cooling rate on the transition temperature in Bi-Pb-Sr-Ca-Cu-O system
[DE91-628643] N92-12762

TRANSLATING
On the construction of translation and rotation invariant morphological operators
[CWI-AM-R9025] N92-12486

TRANSMISSION FLUIDS
A comparison of three methods for solving flow equations of two immiscible fluids in variably saturated media
[DE91-016945] N92-12220

TRANSMISSION LOSS
Techniques for containing error propagation in compression/decompression schemes N92-12433

TRANSMITTERS
Coherent communication link using diode-pumped lasers
[NASA-CR-189248] N92-12149

TRANSONIC FLOW
Control aspects of the transition from transversal to transonic flow, step effects
[ETN-91-90106] N92-11981
Study of a technique of low level turbulence detection
[ETN-91-90107] N92-12215

TRANSONIC SPEED
Investigation of the aeroelastic stability of the AFW wind-tunnel model using CAP-TSD
[NASA-TM-104142] N92-11977

TRANSPORT PROPERTIES
Advanced study in solid transport: Rheological behavior of dense suspension
[DE90-009025] N92-12196
Plasma properties
[DE90-012865] N92-12693
Resistive MHD turbulence
[DE90-012935] N92-12700
Theory of exotic superconducting and normal states of heavy electron and high T(sub c) materials
[DE90-012688] N92-12745

TRANSPORTATION
Study of hypersonic flow turbulence models
[CERT-RF-36/5005-32] N92-11971

TRANSPORTATION ENERGY
Forecast of transportation energy demand through the year 2010
[DE92-000222] N92-12788

TRAPPING
Trapping of neutral atoms with resonant microwave radiation N92-12623

TRAYS
Imaging analysis of LDEF craters N92-12927

TREES (MATHEMATICS)
On finding minimum-diameter clique trees
[DE92-000386] N92-12579

TRIBOLOGY
Material and lubricant relationships in the tribology of internal combustion engines
[DE92-000674] N92-12284

TRITIUM
Direct measurements of neutrino mass
[DE92-000168] N92-12638
Physics study of the application of an IFEL (Induction Free Electron Laser) to CIT (Compact Ignition Tokamak)
[DE90-011276] N92-12690
Tritium proof-of-principle pellet injector
[DE92-000390] N92-12734
Solid state radioluminescent sources using tritium-loaded zeolites
[DE91-019081] N92-12759

TRITON
Studies of Triton and the Pluto-Charon system N92-12850

TROPICAL REGIONS
A Pacific Ocean general circulation model for satellite data assimilation
[NASA-CR-189447] N92-12384

TROPOSPHERE
Cloud parameterization for climate models
[DE90-014344] N92-12369
Studies of thermal wave phenomena on the Jovian planets N92-12809
Studies of thermal wave phenomena on the Jovian planets N92-12867

TUNABLE LASERS
A tunable continuous-wave titanium-doped sapphire laser
[FFI-91/7006] N92-12254
Potential of tuneable lasers for optimised dual-colour laser ranging
[REPT-911-440-111] N92-12255

TUNGSTEN
Ductile-brittle transition temperature testing of tungsten using the three-point bend test
[DE92-000099] N92-12116

TUNING
First order tune shift calculations for transverse betatron dynamics
[DE92-000370] N92-12668

TURBINE BLADES
Strength evaluation for modified 12Cr steel and A286 steel of USC turbine rotor materials
[DE90-503033] N92-12099
Effects of wake and shock passing on the heat transfer to a film cooled transonic turbine blade N92-12201
Heat transfer and instrumentation studies on rotating turbine blades in a transient facility N92-12203
Blade surface pressure measurements on the rotor of a model turbine stage in a transient flow facility N92-12206
Failure analysis of turbine blades
[DE91-631513] N92-12282

TURBINE INSTRUMENTS
Calibration of an FTI Omnitrak ballistic flow calibrator system
[NRC-29847] N92-12233

TURBINE PUMPS
Velocity and pressure characteristics of a model SSME high pressure fuel turbopump
[NASA-CR-184239] N92-12273

TURBOGENERATORS
Electricity from waste heat
[DE91-527080] N92-12331

TURBOPROP ENGINES
Preliminary analysis of baseline vibration data from Allison T56-A-14FE engine and reduction gearbox
[NRC-31578] N92-11999

TURBULENCE
Study of hypersonic flow turbulence models
[CERT-RF-36/5005-32] N92-11971
Generation of auroral kilometric radiation in upper hybrid wave-lower hybrid soliton interaction
[MPE-PREPRINT-202] N92-12364
Manifestations of dynamo driven large-scale magnetic field in accretion disks of compact objects N92-12940

TURBULENCE METERS
Study of a technique of low level turbulence detection
[ETN-91-90107] N92-12215

TURBULENCE MODELS
An assessment and application of turbulence models for hypersonic flows
[NASA-TM-105124] N92-11984
Numerical simulation of compressible homogeneous turbulence N92-12204
Development of atmospheric diffusion evaluation method incorporating thermal and topographical effects. Part 2: A literature review of turbulence model under topographical condition
[DE90-503795] N92-12345
Effect of the equilibrium magnetic field on plasma edge fluctuations
[DE90-012720] N92-12692

TURBULENT BOUNDARY LAYER
Study of hypersonic flow turbulence models
[CERT-RF-36/5005-32] N92-11971
An experimental technique for investigation of instantaneous wall heat flux to a turbulent boundary layer in water N92-12200
Turbulence control by intake
[CERT-RF-67/5004-37] N92-12211
Turbulent boundary layer solution for two-dimensional compressible flow using mixing length and K-epsilon turbulence models
[AD-A233771] N92-12213
Study of a technique of low level turbulence detection
[ETN-91-90107] N92-12215

TURBULENT FLOW
An assessment and application of turbulence models for hypersonic flows
[NASA-TM-105124] N92-11984
An experimental and computational investigation of an annular reverse-flow combustor
[UTIAS-338] N92-11996
Development of advanced flow simulation system by water flow model
[DE90-503438] N92-12197
Numerical simulation of compressible homogeneous turbulence N92-12204
Boundary layer transition
[CERT-RTS-55/5018-45] N92-12210
Turbulence control by intake
[CERT-RF-67/5004-37] N92-12211
TURCOM: A computer code for the calculation of transient, multi-dimensional, turbulent, multi-component chemically reactive fluid flows. Part 2: Compressible and combusting flow
[NRC-29287-PT-2] N92-12214
Study of detached turbulent flow in an air intake by means of high speed tomography and laser velocimetry
[REPT-90/55] N92-12216
Turbulization of shear flows in astrophysics N92-12941

TURBULENT HEAT TRANSFER
Heat transfer and instrumentation studies on rotating turbine blades in a transient facility N92-12203

TURBULENT MIXING
Turbulent boundary layer solution for two-dimensional compressible flow using mixing length and K-epsilon turbulence models
[AD-A233771] N92-12213

TURBULENT WAKES
Phenomenological modeling of the wake produced by a straight two dimensional base in subsonic flow
[REPT-90/59] N92-11982
SAR imaging of vortex ship wakes. Volume 3: An overview of pre-ERS-1 observations and models
[FFI-91/7007-VOL-3] N92-12157

TWO DIMENSIONAL MODELS
The BCAC/IAR collaborative research program to investigate the sidewall boundary layer effects in the IAR/NRC 2-D High Reynolds Number Test Facility
[NRC-HSA-434] N92-11976
Phenomenological modeling of the wake produced by a straight two dimensional base in subsonic flow
[REPT-90/59] N92-11982
The need for superconducting magnets for MHD seawater propulsion
[DE90-013651] N92-12705
On two-dimensional relativistic stellar winds N92-12947

TYPE 2 BURSTS
Third plasma harmonic radiation in type 2 bursts
[MPE-PREPRINT-203] N92-12982

U

U.S.S.R. SPACE PROGRAM
Georgian space research program N92-12955

ULTRASONIC FLAW DETECTION
Nondestructive testing of sandwich structures
[REPT-911-430-137] N92-12066

Acoustic emission applied to composite material structures
[REPT-911-430-138] N92-12067
Design of a long isotropic buffer rod
[NRC-28903] N92-12290

ULTRASONIC RADIATION
Extraction apparatus with pulsed columns for monitoring dispersed phase
[DE91-017680] N92-12209

ULTRASONIC SCANNERS
Operations manual for reading VAK-3 ultrasonic seals using a data acquisition box
[DE90-013644] N92-12143
Design of a long isotropic buffer rod
[NRC-28903] N92-12290

ULTRASONIC TESTS
Acoustic emission applied to composite material structures
[REPT-911-430-138] N92-12067
Ultrasonic investigation of amorphous polymers (polystyrene) in a wide range of temperature and pressure. 1: Introduction, method, technique, and results
[NRC-29718] N92-12125
Operations manual for reading VAK-3 ultrasonic seals using a data acquisition box
[DE90-013644] N92-12143
Acousto-ultrasonics for adhesive bond evaluation
[NRC-LTR-ST-1799] N92-12289
Ultrasonic applications for space-based life support systems N92-12415

ULTRASONICS
Method of recertifying a loaded bearing member
[NASA-CASE-LAR-14168-1] N92-12302
Ultrasonic applications for space-based life support systems N92-12415

ULTRAVIOLET ASTRONOMY
Groundbased cometary studies N92-12841

ULTRAVIOLET EMISSION
Absolute velocity measurements in the solar transition region and corona from observations of ultraviolet emission line profiles N92-12977

ULTRAVIOLET RADIATION
The greenhouse effect and acid rain
[DE90-008347] N92-12340

ULTRAVIOLET SPECTROSCOPY
Infrared and ultraviolet spectroscopic ellipsometry using a cascaded arc as light source N92-12719

ULYSSES MISSION
Update of Ulysses FSAR results using updated NASA probabilities
[DE90-012504] N92-12008
Uncertainty analysis report for Ulysses, volume 1
[DE91-013476] N92-12039
Safety Evaluation Report for Ulysses, volume 2
[DE91-013475] N92-12040
Safety Evaluation Report for Ulysses, volume 1
[DE91-013473] N92-12047

UNDERGROUND STORAGE
Environmental projects. Volume 13: Underground storage tanks, removal and replacement. Goldstone Deep Space Communications Complex
[NASA-CR-189030] N92-12035
Development of a non-propagating explosives storage cabinet
[DE91-017923] N92-12148
Survey on possibility to utilize effectively underground space
[DE92-703044] N92-12417

UNDERGROUND STRUCTURES
Survey on possibility to utilize effectively underground space
[DE92-703044] N92-12417

UNDERWATER ACOUSTICS
Ocean/bottom acoustic interaction with arbitrary bottom profile
[FFI-91/7009] N92-12386

UNDERWATER OPTICS
Lawrence Livermore National Laboratory Underwater Laser Imaging System (UWLIS) development project
[DE91-019001] N92-12258

UNDERWATER PHOTOGRAPHY
Lawrence Livermore National Laboratory Underwater Laser Imaging System (UWLIS) development project
[DE91-019001] N92-12258

UNDERWATER VEHICLES
Thulium heat source for high-endurance and high-energy density power systems
[DE91-018991] N92-12666

UNIFIED FIELD THEORY
Lectures on RCFT (Rational Conformal Field Theory)
[DE90-013731] N92-12593

UNIVERSE
High-Energy Astrophysics. American and Soviet Perspectives
[NASA-CR-186558] N92-12933
Chaotic inflationary universe and the anisotropy of the large-scale structure N92-12943
Can a man-made universe be achieved by quantum tunneling without an initial singularity? N92-12951
The formation and evolution of domain walls N92-12965

UNSTEADY AERODYNAMICS
Nonstationary flight aerodynamics in a turbulent environment
[ETN-91-90102] N92-11980

UNSTEADY FLOW
Over forty years of continuous research at UTIAS on nonstationary flows and shock waves
[UTIAS-50] N92-11974
Blade surface pressure measurements on the rotor of a model turbine stage in a transient flow facility N92-12206
Vorticity dynamics of inviscid shear layers
[NASA-CR-189042] N92-12212
Velocity and pressure characteristics of a model SSME high pressure fuel turbopump
[NASA-CR-184239] N92-12273

UPPER ATMOSPHERE
Measurement of charge exchange reaction constants both at equilibrium and out of equilibrium in a Paul trap
[ETN-91-90103] N92-12361
Occultation studies of the solar system N92-12810

UPSTREAM
Efficient multi-dimensional upwinding for the steady Euler equations
[CWI-NM-R9107] N92-12570

UPWASH
A comparative analysis of XV-15 tiltrotor hover test data and WOPWOP predictions incorporating the fountain effect
[NASA-CR-189455] N92-11992

URANUS RINGS
Detection of solid C(triple bond)N bearing materials on solar system bodies N92-12866

USER MANUALS (COMPUTER PROGRAMS)
Probabilistic Structural Analysis Methods (PSAM) for select space propulsion systems components
[NASA-CR-187199] N92-12307
Large angle transient dynamics (LATDYN) documentation. Post-processor manual
[NASA-TM-104126] N92-12309
Interactive Office user's manual
[NASA-CR-184203] N92-12447
Interactive digital image display and analysis system (IDIDAS) user's guide
[NOAA-TR-NESDIS-59] N92-12470

USER REQUIREMENTS
Helicopter integrated helmet requirements and test results
[MBB-UD-0595-91-PUB] N92-12422

UTILITIES
Photovoltaics: New opportunities for utilities
[DE91-002168] N92-12334

UTILIZATION
Survey on possibility to utilize effectively underground space
[DE92-703044] N92-12417

V

VACUUM
Prospects in extended inflation N92-12900
Can a man-made universe be achieved by quantum tunneling without an initial singularity? N92-12951

VACUUM APPARATUS
Vacuum-isolation vessel and method for measurement of thermal noise in microphones
[NASA-CASE-LAR-14567-1-CU] N92-12174

VACUUM EFFECTS
Topics in gauge theories and the unification of elementary particle interactions
[DE90-013435] N92-12603

VACUUM FURNACES
Materials processing in low gravity
[NASA-CR-184213] N92-12139
Modifications to the rapid melt/rapid quench and transparent polymer video furnaces for the KC-135
[NASA-CR-184215] N92-12231

VANES
Failure analysis of turbine blades
[DE91-631513] N92-12282

VAPOR DEPOSITION
Photon enhanced chemical vapor deposition of carbon based thin films from toluene vapor N92-12720
The a-Si:H films produced by an expanding argon-silane plasma investigated with spectroscopic infrared ellipsometry N92-12721
A system to deposit boron films (boronization) in the D3-D tokamak
[DE92-000288] N92-12733

VAPOR PHASE EPITAXY
Design and study of photon-assisted heteroepitaxial growth system
[LAAS-91187] N92-12753

VAPOR PHASES
Hydrogen isotopic exchange over palladium metal
[DE90-012063] N92-12076
Laboratory simulation of the surface of Halley's Comet N92-12872
Methanol in the sky with diamonds N92-12903

VAPOR PRESSURE
Vapour pressures and critical points of liquids. Halogenated ethylenes
[ESDU-91006] N92-12081

VAPORIZERS
Boiling inside tubes: Saturated wet-wall heat transfer with mixtures
[ESDU-91011] N92-12208

VAPORIZING
A planar-fluorescence imaging technique for studying droplet-turbulence interactions in vaporizing sprays N92-12050

VAPORS
An experimental study of the volatility of ammonium chloride from aqueous solutions to high temperatures
[DE91-017875] N92-12090
The origin of amorphous rims on lunar plagioclase grains: Solar wind damage or vapor condensates N92-12918

VARIABILITY
Infrared variability of Jupiter and Saturn N92-12825
Outer planet studies N92-12829

VARIABLE GEOMETRY STRUCTURES
An improved model-creation program for EM interaction analysis
[NRC-31764] N92-12153

VARIATIONAL PRINCIPLES
The theory of variational inequalities and its application to contact problems with friction
[ETN-91-90183] N92-12562

VECTOR PROCESSING (COMPUTERS)
Vectorization and parallelization of the AEROLOG3D code in collaboration with Matra
[ONERA-RF-37/3479-CY] N92-12508

VECTOR SPACES
The theory of variational inequalities and its application to contact problems with friction
[ETN-91-90183] N92-12562
Consistent multiparameter quantisation of GL(n)
[DE90-013689] N92-12592

VECTORS (MATHEMATICS)
Consistency conditions and representations of a q-deformed Virasoro algebra
[DE90-013715] N92-12359

VEGETATION
Microwave remote sensing and radar polarization signatures of natural fields
[NASA-CR-189249] N92-12317
Rangeland-plant response to elevated CO2
[DE90-013702] N92-12387

VEGETATION GROWTH
Division of Energy Biosciences: Summaries of FY 1991 activities
[DE92-000518] N92-12401

VEHICULAR TRACKS
Selected methods for the investigation of linear, continuous and discrete-continuous mechanical models of a rail
[ILR-MITT-261(1991)] N92-12277

VELOCITY
Hypervelocity explosive launchers
[DE90-011713] N92-12036
Numerical solution of incompressible Navier-Stokes equations using a velocity-vorticity formulation N92-12205

VELOCITY DISTRIBUTION
Flow visualization and flow field measurements of a 1/12 scale tilt rotor aircraft in hover
[NASA-CR-189456] N92-11983
Turbulence control by intake
[CERT-RF-67/5004-37] N92-12211
Radar interferometric studies of comets N92-12845
The peculiar velocity field predicted from the distribution of IRAS galaxies N92-12969

VELOCITY MEASUREMENT
Position and velocity measuring system
[AD-D014975] N92-12232
Velocity and pressure characteristics of a model SSME high pressure fuel turbopump
[NASA-CR-184239] N92-12273
The radial velocity search for extrasolar planets N92-12832
The companion object to HD114762 N92-12865
Absolute velocity measurements in the solar transition region and corona from observations of ultraviolet emission line profiles N92-12977

VENERA SATELLITES
A statistical analysis of gamma-ray bursts detected by the Konus Experiment on Venera 11 and 12 N92-12966
VENTILATION
Air movement, comfort and ventilation in workstations [DE92-000667] N92-12424
VENUS (PLANET)
Arecibo S-band radar program N92-12803
Goldstone solar system radar N92-12873
Deuterium on Venus: Observations from Earth N92-12879
Radar studies in the solar system N92-12886
VENUS ATMOSPHERE
Deuterium on Venus: Observations from Earth N92-12879
VENUS SURFACE
Goldstone solar system radar N92-12873
VERTICAL DISTRIBUTION
A study of the temporal behavior of the vertical structure of Jupiter's atmosphere N92-12976
VERTICAL TAKEOFF AIRCRAFT
Application of Eigenstructure Assignment to the control of powered lift combat aircraft [RAE-TM-FS-1009] N92-12004
VERY LARGE ARRAY (VLA)
Radar interferometric studies of comets N92-12845
Goldstone solar system radar N92-12873
Observations of formaldehyde and search for cyanoacetylene in Comet Brorsen-Metcalf (1988o) N92-12887
VERY LARGE SCALE INTEGRATION
The energy complexity of threshold and other functions (preliminary version) [CWI-CS-R9101] N92-12186
Algorithms and VLSI architecture designs for image transformation in real time [TELECOM-PARIS-90-E-021] N92-12489
Real-time VLSI architecture for geometric image transformations N92-12490
VERY LONG BASE INTERFEROMETRY
Observation model and parameter partials for the JPL VLBI parameter estimation software MODEST/1991 [NASA-CR-189035] N92-12481
VIBRATION
Variable impedance journal bearings for rotor-bearing systems N92-12270
Determination of the effects of wind-induced vibration on cylindrical beams [NASA-TM-103824] N92-12300
Modal interaction in linear dynamic systems near degenerate modes [NASA-TM-105315] N92-12316
VIBRATION DAMPING
Optimal control of large space structures using distributed gyricity: A continuum approach [UTIAS-341] N92-12042
An analytical and experimental study to investigate flutter suppression via piezoelectric actuation [NASA-TM-893240] N92-12173
Adaptation of an industrial application for an instructional laboratory in mechanical vibrations [DE90-013692] N92-12295
Methods for improving damping. Part 1: An introduction and guide to practical methods of increasing structural damping [ESDU-91012-PT-1] N92-12301
VIBRATION EFFECTS
Preliminary analysis of baseline vibration data from Allison T56-A-14FE engine and reduction gearbox [NRC-31578] N92-11999
VIBRATION ISOLATORS
Vacuum-isolation vessel and method for measurement of thermal noise in microphones [NASA-CASE-LAR-14567-1-CU] N92-12174
VIBRATION MEASUREMENT
Identification of complex modules in othotropic materials by means of free vibration analysis [REPT-911-550-101] N92-12311
Acoustic characteristics of anechoic chamber at FFA [FFA-TN-1990-43] N92-12599
VIBRATION TESTS
Identification of complex modules in othotropic materials by means of free vibration analysis [REPT-911-550-101] N92-12311
VIBRATIONAL SPECTRA
Novel approaches to the calculation of the electronic structure and dynamics of excited states: Application to trans-di-imide and ethylene [ETN-91-90309] N92-12628
Semiclassical calculation of the vibrational structure of the (B) 1B(sub u) Rydberg state of trans-di-imide from ab initio CI potential energy surfaces N92-12629
Laser studies of the photodissociation dynamics of cometary radicals N92-12823
VIDEO COMMUNICATION
Huntsville Operations Support Center N92-12024
VIDEO EQUIPMENT
Unattended optical surveillance equipment [DE90-013403] N92-12228
Modifications to the rapid melt/rapid quench and transparent polymer video furnaces for the KC-135 [NASA-CR-184215] N92-12231
Lawrence Livermore National Laboratory Underwater Laser Imaging System (UWLIS) development project [DE91-019001] N92-12258
VINYL COPOLYMERS
Pyroelectric detectors processed on polyvinylidene fluoride and on copolymer, integrated on silicon substrate: Technological approach of infrared unit sensors and matrix arrays [LAAS-91134] N92-12236
VISCOELASTICITY
Ultrasonic investigation of amorphous polymers (polystyrene) in a wide range of temperature and pressure. 1: Introduction, method, technique, and results [NRC-29718] N92-12125
VISCOSITY
Electron beam irradiation of polymer blends [ETN-91-90139] N92-12122
VISCOUS FLUIDS
Fluid oscillations and enhanced heat transfer in a parallel plate channel bounded by end reservoirs maintained at different temperature N92-12202
VISIBILITY
SAR imaging of vortex ship wakes. Volume 3: An overview of pre-ERS-1 observations and models [FFI-91/7007-VOL-3] N92-12157
VISUAL PERCEPTION
Perceived sharpness in static and moving images [ETN-91-90138] N92-12413
Helmet mounted sight and display testing [MBB-UD-0594-91-PUB] N92-12421
VLASOV EQUATIONS
Nonlinear resonant absorption and wave breaking (Vlasov simulation of resonance excited plasma waves) [ETN-91-90172] N92-12714
VOLATILITY
An experimental study of the volatility of ammonium chloride from aqueous solutions to high temperatures [DE91-017875] N92-12090
VOLCANOES
Infrared speckle interferometry and spectroscopy of Io N92-12820
Infrared speckle interferometry and spectroscopy of Io N92-12870
Tentative identification of a newly discovered class of material on Io N92-12892
VOLUME
Excess mixing volumes and specific interactions in organic molecule mixing [ETN-91-90171] N92-12616
VORTICES
An experimental and computational investigation of an annular reverse-flow combustor [UTIAS-338] N92-11996
SAR imaging of vortex ship wakes. Volume 3: An overview of pre-ERS-1 observations and models [FFI-91/7007-VOL-3] N92-12157
VORTICITY
Numerical solution of incompressible Navier-Stokes equations using a velocity-vorticity formulation N92-12205
Vorticity dynamics of inviscid shear layers [NASA-CR-189042] N92-12212
Existence of three dimensional, steady, inviscid, incompressible flows with nonvanishing vorticity [PREPRINT-1365] N92-12219
VOTING
The stock exchange market and company groups [REPT-90-015] N92-12776

W

WAKES
Effects of wake and shock passing on the heat transfer to a film cooled transonic turbine blade N92-12201
WALL FLOW
Slotted-wall research with disk and parachute models in the DSMA low-speed wind tunnel [DE90-013631] N92-11966
The BCAC/IAR collaborative research program to investigate the sidewall boundary layer effects in the IAR/NRC 2-D High Reynolds Number Test Facility [NRC-HSA-434] N92-11976
WALL PRESSURE
Flat planes in rarefied hypersonic flows [SESSIA-430/91-940] N92-11979
Procedure for determination of three-dimensional wind tunnel wall interferences and wall adaptation in compressible subsonic flow using measured wall pressures [DLR-FB-91-09] N92-12005
WALL TEMPERATURE
Maintaining optimum light output with a thermally conductive heat pipe [DE90-012423] N92-12195
An experimental technique for investigation of instantaneous wall heat flux to a turbulent boundary layer in water N92-12200
Boundary layer transition [CERT-RTS-55/5018-45] N92-12210
WALLS
An experimental technique for investigation of instantaneous wall heat flux to a turbulent boundary layer in water N92-12200
Conventional wallboard with latent heat storage for passive solar applications [DE90-012136] N92-12325
Analysis of wallboard containing a phase change material [DE90-012163] N92-12326
WARFARE
Requirements and possible technical solutions derived from the new airmobility concept of the German Army [MBB-UD-0596-91-PUB] N92-12590
WASTE HEAT
Electricity from waste heat [DE91-527080] N92-12331
WASTE WATER
Mercury as an environmental pollutant [DE90-013392] N92-12349
WASTES
Environmental projects. Volume 13: Underground storage tanks, removal and replacement. Goldstone Deep Space Communications Complex [NASA-CR-189030] N92-12035
WATER
Analysis of minerals containing dissolved traces of the fluid phase components water and carbon dioxide [NASA-CR-188993] N92-12083
Quick separation and determination of Pm-147 in water by HDEHP-KeL-F chromatography [DE91-628873] N92-12094
Properties of liquid water and carbon dioxide from constant pressure-constant temperature molecular dynamics [DE91-018219] N92-12633
Outburst of Comet Halley at 14.3 AU N92-12881
Minor planet 1566 Icarus: Asteroid or comet? N92-12895
Extraterrestrial water of possible Martian origin in SNC meteorites: Constraints from oxygen isotopes N92-12917
WATER FLOW
Development of advanced flow simulation system by water flow model [DE90-503438] N92-12197
An experimental technique for investigation of instantaneous wall heat flux to a turbulent boundary layer in water N92-12200
Three dimensional shallow water model on the Cray Y-MP4/464 [CWI-NM-R9106] N92-12487
WATER QUALITY
Ecological Research between the Univ. of Georgia and DOE. Volume 1: Main report [DE90-012109] N92-12341
WATER RESOURCES
Processes for identifying regional influences of and responses to increasing atmospheric CO2 and climate change: The MINK project [DE91-018607] N92-12354
Processes for identifying regional influences of and responses to increasing atmospheric CO2 and climate change: The MINK project [DE91-018608] N92-12355
WATER VAPOR
Measurements of heat and mass transfer coefficients during absorption of water vapor by lithium bromide and (Li,K,Na)NO3 mixtures [DE91-014212] N92-12088
Cloud parameterization for climate models [DE90-014344] N92-12369
WATER WAVES
Two-dimensional wave number spectra of small-scale water surface waves N92-12379
WATERWAVE ENERGY CONVERSION
Ocean energy contract list, fiscal year 1990 [DE91-002177] N92-12333
WAVE ATTENUATION
Nonlinear resonant absorption and wave breaking (Vlasov simulation of resonance excited plasma waves) [ETN-91-90172] N92-12714

WAVE DEGRADATION
Nonlinear resonant absorption and wave breaking (Vlasov simulation of resonance excited plasma waves)
[ETN-91-90172] N92-12714
WAVE EXCITATION
On the nature of pulsar radiation N92-12956
WAVE FUNCTIONS
Bit-string scattering theory
[DE90-008013] N92-12555
CEPA-type size consistency corrections for MRSDCI calculations, MRCEPA N92-12631
WAVE INTERACTION
Generation of auroral kilometric radiation in upper hybrid wave-lower hybrid soliton interaction
[MPE-PREPRINT-202] N92-12364
Backward collinear acousto-optic interactions in bulk materials
[NRC-29095] N92-12679
WAVE PROPAGATION
Extraction apparatus with pulsed columns for monitoring dispersed phase
[DE91-017680] N92-12209
Wave propagation and scattering in layered media: Application to ultrasonic nondestructive evaluation of interfacial cracks and earthquake ground motion N92-12285
Two-dimensional wave number spectra of small-scale water surface waves N92-12379
Full-wave calculation of fast-wave current drive in tokamaks including k(sub (parallel)) upshifts
[DE92-000048] N92-12726
On the nature of pulsar radiation N92-12956
WAVE SCATTERING
Wave propagation and scattering in layered media: Application to ultrasonic nondestructive evaluation of interfacial cracks and earthquake ground motion N92-12285
Bit-string scattering theory
[DE90-008013] N92-12555
WAVE-PARTICLE INTERACTIONS
Influence of wave-particle interactions on solar flare dynamics N92-12978
WAVEGUIDES
Linearisation of diode detectors for use in a multistate reflectometer
[NPL-DES-104] N92-12241
WAVELENGTHS
Potential of tuneable lasers for optimised dual-colour laser ranging
[REPT-911-440-111] N92-12255
WEAK INTERACTIONS (FIELD THEORY)
Precision experiments in electroweak interactions
[DE90-013568] N92-12607
Few-body collisions in a weakly interacting Bose gas
[ETN-91-90307] N92-12621
WEAPON SYSTEMS
Computer aided design of weapon system guidance and control with predictive functional control technique N92-12463
A development-memory approach for enhancing avionics software logistics N92-12540
WEAR
Electroless vs electrodeposited Ni-P alloys for diamond turning applications
[DE91-018999] N92-12113
WEAR RESISTANCE
Material and lubricant relationships in the tribology of internal combustion engines
[DE92-000674] N92-12284
WEATHER
Objective method for assessing monitoring networks
[DE90-505577] N92-12346
WEATHER FORECASTING
Summary of 1991 Atlantic tropical cyclone activity and seasonal forecast verification: A year of no hurricanes in the tropics but an unusually large number of higher latitude baroclinically influenced tropical cyclone systems N92-12376
Extended range forecast of Atlantic seasonal hurricane activity for 1992 N92-12377
An atlas of monthly mean distributions of GEOSAT sea surface height, SSMI surface wind speed, AVHRR/2 sea surface temperature, and ECMWF surface wind components during 1988
[NASA-CR-189029] N92-12385
WEATHERING
Carbon and oxygen isotope composition of carbonates from an L6 chondrite: Evidence for terrestrial weathering from the Holbrook meteorite N92-12928
WEIGHT REDUCTION
Multimegawatt space power reactors
[DE90-012965] N92-12657
WEIGHTLESSNESS
Incipient boiling in microgravity N92-12140
Flight Research Laboratory T-33 microgravity facility flight operations, 1986 to 1990
[NRC-32136] N92-12142
WELD TESTS
On the formation of a joint during cold welding
[DE91-017672] N92-12275
WELDABILITY
Weldability of iron aluminides
[DE90-012722] N92-12096
WELDED JOINTS
On the formation of a joint during cold welding
[DE91-017672] N92-12275
WELDING MACHINES
The variable polarity plasma arc welding process: Characteristics and performance
[NASA-CR-184259] N92-12279
WELLS
Cooling of ions trapped in potential wells produced by electromagnetic radiation fields
[DE91-631104] N92-12635
WHISKER COMPOSITES
Strengthening of composites by internal stresses: Determination by neutron diffraction
[DE91-018549] N92-12756
WIGGLER MAGNETS
Progress with the slotted-tube pulsed microwiggler
[DE92-000173] N92-12260
The performance of a superconducting micro-undulator prototype
[DE90-012639] N92-12743
WIND (METEOROLOGY)
Storm calendar 1964-1990: Chronological survey of all storms (wind force 8 and higher) along the Dutch coast in the period 1964-1990
[KNMI-176] N92-12374
An atlas of monthly mean distributions of GEOSAT sea surface height, SSMI surface wind speed, AVHRR/2 sea surface temperature, and ECMWF surface wind components during 1988
[NASA-CR-189029] N92-12385
WIND EFFECTS
A concept for treating dense-gas dispersion under realistic conditions of terrain and variable winds
[DE90-012892] N92-12343
WIND MEASUREMENT
VIERS-1, part 2: Completion of the laboratory experiments
[BCRS-90-27] N92-12378
WIND PROFILES
VIERS-1, part 2: Completion of the laboratory experiments
[BCRS-90-27] N92-12378
The wind profile in a wave flume N92-12380
WIND SHEAR
The modelling of turbulence and downbursts for flight simulators
[UTIAS-339] N92-12373
WIND TUNNEL APPARATUS
Computer programs for the calculation of dual sting pitch and roll angles required for an articulated sting to obtain angles of attack and sideslip on wind-tunnel models
[NASA-TM-104161] N92-12007
WIND TUNNEL MODELS
Slotted-wall research with disk and parachute models in the DSMA low-speed wind tunnel
[DE90-013631] N92-11966
The BCAC/IAR collaborative research program to investigate the sidewall boundary layer effects in the IAR/NRC 2-D High Reynolds Number Test Facility
[NRC-HSA-434] N92-11976
Computer programs for the calculation of dual sting pitch and roll angles required for an articulated sting to obtain angles of attack and sideslip on wind-tunnel models
[NASA-TM-104161] N92-12007
WIND TUNNEL TESTS
Slotted-wall research with disk and parachute models in the DSMA low-speed wind tunnel
[DE90-013631] N92-11966
Thermographic gust wind tunnel measurements
[ONERA-RF-31/3409-PY] N92-11972
Wind tunnel tests on A4, A4.1, and A4.2 2-D airfoil models in the IAR 5-ft. wind tunnel: Boeing Commercial Airplane Company and Institute for Aerospace Research collaborative work program
[NRC-IAR-C3] N92-11975
The BCAC/IAR collaborative research program to investigate the sidewall boundary layer effects in the IAR/NRC 2-D High Reynolds Number Test Facility
[NRC-HSA-434] N92-11976
Flat planes in rarefied hypersonic flows
[SESSIA-430/91-940] N92-11979
Nonstationary flight aerodynamics in a turbulent environment
[ETN-91-90102] N92-11980
Control aspects of the transition from transversal to transonic flow, step effects
[ETN-91-90106] N92-11981
Phenomenological modeling of the wake produced by a straight two dimensional base in subsonic flow
[REPT-90/59] N92-11982
Study of interactions on anemoclinometric sensors
[REPT-90/30] N92-12006
CARS temperature measurements in a hypersonic propulsion test facility N92-12049
WIND TUNNEL WALLS
Wind tunnel tests on A4, A4.1, and A4.2 2-D airfoil models in the IAR 5-ft. wind tunnel: Boeing Commercial Airplane Company and Institute for Aerospace Research collaborative work program
[NRC-IAR-C3] N92-11975
Procedure for determination of three-dimensional wind tunnel wall interferences and wall adaptation in compressible subsonic flow using measured wall pressures
[DLR-FB-91-09] N92-12005
WIND TURBINES
A PC-based telemetry system for acquiring and reducing data from multiple PCM streams
[DE91-002199] N92-12037
WIND VELOCITY
Determination of the effects of wind-induced vibration on cylindrical beams
[NASA-TM-103824] N92-12300
Storm calendar 1964-1990: Chronological survey of all storms (wind force 8 and higher) along the Dutch coast in the period 1964-1990
[KNMI-176] N92-12374
Two-dimensional wave number spectra of small-scale water surface waves N92-12379
The wind profile in a wave flume N92-12380
An atlas of monthly mean distributions of GEOSAT sea surface height, SSMI surface wind speed, AVHRR/2 sea surface temperature, and ECMWF surface wind components during 1988
[NASA-CR-189029] N92-12385
WINDS ALOFT
Extended range forecast of Atlantic seasonal hurricane activity for 1992 N92-12377
WING FLOW METHOD TESTS
Control aspects of the transition from transversal to transonic flow, step effects
[ETN-91-90106] N92-11981
WING OSCILLATIONS
Nonstationary flight aerodynamics in a turbulent environment
[ETN-91-90102] N92-11980
WING PANELS
Nonstationary flight aerodynamics in a turbulent environment
[ETN-91-90102] N92-11980
WING PROFILES
Maximum lift of wings with trailing-edge flaps at low speeds
[ESDU-91014] N92-11970
Control aspects of the transition from transversal to transonic flow, step effects
[ETN-91-90106] N92-11981
WINGS
Lift-curve slope of wing-body combinations
[ESDU-91007] N92-11968
WOOD
Monitoring IACP samples and construction of a centralized database
[PB91-213546] N92-12351
WORK HARDENING
Ductile-brittle transition temperature testing of tungsten using the three-point bend test
[DE92-000099] N92-12116
WORKLOADS (PSYCHOPHYSIOLOGY)
Ames life science telescience testbed evaluation
[NASA-CR-188856] N92-12033
A threat management system N92-12535
WORKSTATIONS
Advanced laptop and small personal computer technology N92-12029
Air movement, comfort and ventilation in workstations
[DE92-000667] N92-12424
Software design considerations for an airborne command and control workstation N92-12455
Interactive digital image display and analysis system (IDIDAS) user's guide
[NOAA-TR-NESDIS-59] N92-12470
Advanced Satellite Workstation (ASW) N92-12521
A distributed agent architecture for real-time knowledge-based systems: Real-time expert systems project, phase 1
[NASA-CR-188947] N92-12781

X

X RAY ABSORPTION
X-ray observations of SS 433 and the QSO MR 2251-178 N92-12789
X RAY ASTROPHYSICS FACILITY
Extragalactic x ray source counts N92-12967
X RAY BINARIES
Cataclysmic variables in globular clusters and low mass x ray binaries N92-12897
Generation of ultrahigh-energy gamma rays in accreting x ray pulsars N92-12950
Quasi-periodic oscillations in low-mass x ray binaries N92-12958
On the observational appearances of a freely precessing neutron star in Hercules X-1 N92-12963
Radiation-driven evolution of low-mass x ray binaries and the formation of millisecond pulsars
[DE92-000123] N92-12975
X RAY DIFFRACTION
Diffraction by macromolecular fluids
[DE91-016219] N92-12089
X RAY SOURCES
X-ray observations of SS 433 and the QSO MR 2251-178 N92-12789
Observations of x ray pulsars from the Kvant module N92-12949
Extragalactic x ray source counts N92-12967
X RAY SPECTRA
The cyclotron absorption line and eclipse transition phenomena of 4U 1538-52 N92-12944
X ray emission from active galactic nuclei N92-12962
On the observational appearances of a freely precessing neutron star in Hercules X-1 N92-12963
X RAY SPECTROSCOPY
Random uncertainties in the surface spectroscopies
[NPL-DMM(A)-26] N92-12087
Carbonate and sulfate minerals in the Chassigny meteorite N92-12930
X RAY STARS
Observations of x ray pulsars from the Kvant module N92-12949
X RAYS
Workshop on High Heat Load X Ray Optics
[DE90-011799] N92-12673
Effects of oxide layers on optical properties and x ray hardness of Al-Be mirrors
[DE92-000476] N92-12687
Soft x-ray measurement of internal tearing mode structure in a reversed-field pinch
[DE92-000164] N92-12729
High-Energy Astrophysics. American and Soviet Perspectives
[NASA-CR-186558] N92-12933
Cluster research with x ray observations N92-12948
On the origin of the diffuse x ray background N92-12952
The large-scale surface brightness distribution of the x ray background N92-12961
Extragalactic x ray source counts N92-12967
X ray radiation from Supernova 1987A. The results of the Kvant module in 1987-1989 N92-12970
Gas flow and generation of x ray emission in WR+OB binaries N92-12972
Influence of wave-particle interactions on solar flare dynamics N92-12978
XENON 133
A scintillation detector for measuring inert gas beta rays
[DE91-630700] N92-12634
XV-15 AIRCRAFT
A comparative analysis of XV-15 tiltrotor hover test data and WOPWOP predictions incorporating the fountain effect
[NASA-CR-189455] N92-11992

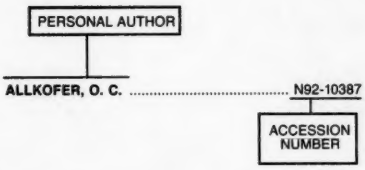
Y

YAG LASERS
The multipulse Thomson scattering diagnostic on the D3-D tokamak
[DE92-000262] N92-12732
YIELD
IC defect-sensitivity: Theory and computational models for yield prediction
[UDC-621.382.049.77:661.306(043)] N92-12175
YIELD POINT
Large area laser conditioning of dielectric thin film mirrors
[DE90-013485] N92-12674
YIELD STRENGTH
Creep in L1(2)-intermetallics
[DE91-018231] N92-12112
Ductile-brittle transition temperature testing of tungsten using the three-point bend test
[DE92-000099] N92-12116
Development of test methods for determining material deformability and yield stress, on the basis of intermetallic connections
[ETN-91-90130] N92-12303
YTTERBIUM COMPOUNDS
Pressure dependence of the specific heat of heavy-fermion YbCu4.5
[DE90-011584] N92-12742
YTTRIUM OXIDES
Effects of ambient background gases on YBCO plume propagation under film growth conditions: Spectroscopic, ion probe, and fast photographic studies
[DE92-000431] N92-12737
Magnetization studies of irradiation modified single crystal Y1Ba2Cu3O7 superconductors: Flux creep and annealing effects
[DE91-018858] N92-12758
Properties of epitaxial YBa2Cu3O(7-delta)-based superconducting superlattices
[DE92-000423] N92-12765
Laser ablation synthesis and properties of epitaxial YBa2Cu3O(7-delta) / PrBa2Cu3O(7-delta) superconducting superlattices
[DE92-000447] N92-12766

Z

ZEOLITES
Solid state radioluminescent sources using tritium-loaded zeolites
[DE91-019061] N92-12759
ZINC
I.S.O. international program on the study of atmospheric corrosion: Results of first year exposure at Boucherville, October 1986 - October 1987
[NRC-28896] N92-12106
ZINC ALLOYS
Ageing characteristics of dendritic and non-dendritic (stir-cast) Zn-Al alloy (ZA-27)
[NRC-28906] N92-12107
ZIRCONIUM
The effect of working process on hydrogenate orientation of Zr-4 alloy tube
[DE91-629474] N92-12114
ZONAL FLOW (METEOROLOGY)
Summary of 1991 Atlantic tropical cyclone activity and seasonal forecast verification: A year of no hurricanes in the tropics but an unusually large number of higher latitude baroclinically influenced tropical cyclone systems N92-12376

Typical Personal Author Index Listing



Listings in this index are arranged alphabetically by personal author. The accession number denotes the number by which the citation is identified.

A

ABARBANEL, SAUL N92-12556
ABBOTT, L. F. N92-12604
ABDALLA, M. D. N92-12190
ABDELMALEK, NABIH N. N92-12559
ABE, TOSHIO N92-12197
ABEYTA, E. E. N92-12133
ABRAHAMSON, A. LOUIS N92-12309
ABRAMSON, DAVID M. N92-12933
ABUELATADOSS, S. N92-12463
ADAMO, DAN N92-12027
ADAMOVITS, PETER J. N92-12523
ADAMS, DENNIS N92-12506
N92-12507
ADCOCK, J. N92-12164
N92-12165
ADKINS, D. R. N92-12324
AFOLABI, D. N92-12316
AFZALI, H. N92-12469
AGBORMBAI, ADOLF A. N92-12620
AGOSTA, CHARLES C. N92-12623
AHEARN, MICHAEL F. N92-12793
N92-12794
AIBA, KOJI N92-12209
AITKEN, J. F. N92-12142
ALBER, HANS-DIETER N92-12219
ALIPPI, C. N92-12511
ALLAMANDOLA, L. J. N92-12866
N92-12902
N92-12903
N92-12906
ALLAN, WILLIAM D. E. N92-12203
ALLEGRE, J. N92-11979
ALLEM, R. N92-12058
ALLEN, S. N92-12695
ALLISON, SIDNEY G. N92-12302
ALLY, M. R. N92-12088
ALTAWAM, AREF NIZAR N92-12296
ALTINEL, ISMAIL KUBAN N92-12587
ALZMANN, MELANIE N92-12360
N92-12362
AMATO, A. N92-12742
N92-12744
AMBROSE, K. R. N92-12411
AMID, S. N92-12252
AMUNDSEN, RUTH M. N92-12045
ANDERSON, R. A. N92-12757
ANDRAKA, C. E. N92-12324
ANSPAUGH, B. E. N92-12332
ANTCLIFF, R. R. N92-12049
APPEL, D. B. N92-12661
ARCHIBALD, C. N92-12252
ARDONCEAU, P. N92-11980
ARENS, E. A. N92-12424
ARIE, DAPHNA BEN N92-12537
ARMOGIDA, FRANK N92-12464
ARMSTRONG, M. J. N92-12750
ARNAL, D. N92-12210
ARNETT, DAVID N92-12934
ARONSON, E. A. N92-12339
ARQUIS, ERIC N92-12755
ARRINGTON, C. A. N92-12605
ARTUSA, E. A. N92-12300
ASAOKA, MASANOBU N92-12221
ASHDOWN, A. M. N92-12467
ASHLEY, C. S. N92-12119
ASSINK, R. A. N92-12074
ATKINSON, DAVID J. N92-12020
ATTWOOD, MIKE C. N92-12589
AUEN, L. M. N92-12387
AUGUSTIJN, B. N92-12374
AUPOIX, B. N92-11971

B

BABCOCK, S. N92-12265
BACKMAN, DANA E. N92-12904
BAETEN, J. C. M. N92-12510
BAGDATLIOGLU, NECATI I. N92-12298
BAILEY, DARRELL G. N92-12024
BAILEY, J. E. N92-12702
BAILLEUX, P. N92-12006
BAILLIE, S. W. N92-11988
BAKKER, DICK M. N92-12583
BAMBERGER, JUDITH A. N92-12054
BANKS, SHEILA B. N92-12531
BANSAL, B. N92-12925
BAR-SHALOM, Y. N92-12585
BARBIER, PIERRE N92-12066
N92-12145
BARBOUR, J. C. N92-12749
BARBOZA, JANET L. N92-12520
BARKER, EDWIN S. N92-12805
N92-12864
BARLOW, N. G. N92-12905
BARNES, P. R. N92-12368
BARNETT, R. N. N92-12608
BARNUM, J. R. N92-12243
BASRAN, J. N92-12546
BASTON, D. W. N92-12009
BATCHELOR, D. B. N92-12726
N92-12736
BATEJAT, DENISE N92-12414
BATEMAN, V. I. N92-12281
BATHKE, CHARLES N92-12730
BATISTIC, I. N92-12764
BATTS, G. W. N92-12375
BAUGHMAN, R. J. N92-12749
BAUMAN, F. S. N92-12424
BAXTER, V. D. N92-12226
BEAUMONT N92-12420
BEEBE, RETA N92-12795
BEEMAN, J. W. N92-12242
BEIN, T. N92-12119
BELL, J. F. N92-12866
BELL, JEFFREY F. N92-12796
BELLE, STEVEN D. N92-12528
BELTON, MICHAEL J. S. N92-12797
N92-12798
N92-12858
N92-12859
BEN-BASSAT, MOSHE N92-12537
BEN-ZVI, I. N92-12743
BENGELSDORF, IRV N92-12035
BENIAMINY, ISRAEL N92-12537
BENJAMIN, ROBERT F. N92-12225
BENNET, M. N92-12335
BENNETT, ROBERT M. N92-11977
BENNINGHOFEN, B. N92-12535
BENSINGER, J. R. N92-12604
BENTLEY, B. F. N92-12249
BERALDIN, J.-A. N92-12476
BERGMAN, C. N92-12166
BERGMANN, ANDREAS N92-12714
BERGSTRA, J. A. N92-12510
BERK, H. L. N92-12198
N92-12612
BERNHARD, R. P. N92-12910
BERNING, SANDRA L. N92-12529
BERTHIER, J. N92-12193
BESKIN, V. S. N92-12935
N92-12936
BESNARD, DIDIER N92-12225
BEULENS, J. J. N92-12720
BEZARD, B. N92-12879
BHATTACHARYYA, GOURI K. N92-12287
BIEG, K. W. N92-12702
BIERI, R. N92-12710
BINGEN, EGIL N92-12675
BINZEL, RICHARD P. N92-12799
BIRCH, J. R. N92-12682
BIRD, J. N92-11998
BISHOP, A. R. N92-12605
N92-12764
BISNOVATYI-KOGAN, G. S. N92-12937
BITTANTI, SERGIO N92-12571
N92-12573
N92-12768
BJOERHUS, MORTEN N92-12576
BLACKMOND, D. G. N92-12138
BLAIR, J. R. S. N92-12579
BLAISDELL, GREGORY ALLAN N92-12204
BLAKE, D. F. N92-12906
BLAKEMAN, E. D. N92-12610
BLANDFORD, R. D. N92-12938
BLEIER, T. E. N92-12521
BLINNIKOV, S. I. N92-12939
BLOCH, ISABELLE N92-12613
BLOCKER, C. A. N92-12604
BLOM, ANDERS F. N92-12313
BLOM, H. A. P. N92-12585
BLOMQUIST, R. N. N92-12222
BLOOM, E. E. N92-12722
BODVARSSON, G. S. N92-12330
BOESCH, R. N92-12649
BOGARD, D. D. N92-12907
N92-12914
BOHL, W. R. N92-12193
BOLEN, DAVE N92-12014
BOLZERN, PAOLO N92-12571
N92-12573
BOND, V. P. N92-12409
BONFANTI, S. N92-12511
BOOTH, R. N92-12150
BOROOMAND, TIRDAD N92-12270
BORSA, J. N92-12423
BOUCHERIE, JOEL N92-12755
BOUDEN, MOUNIR N92-12285
BOULANGER, PIERRE N92-12475
N92-12476
N92-12559
BOURASSA, GREGORY P. N92-12526
BOURCIER, W. L. N92-12908
BOUSIBIAT, ESSAID N92-12236
BOWATER, STEPHEN P. N92-12466
BOWELL, EDWARD N92-12800
N92-12860
N92-12861
BOWES, M. D. N92-12354
BOWN, RODNEY L. N92-12439
BOXMA, O. J. N92-12548
BRADLEY, J. P. N92-12910
BRADLEY, ROY N92-12466
BRADT, R. N92-12132
BRANDT, JOHN C. N92-12801
N92-12862
BREARLEY, ADRIAN J. N92-12909
BREIDENBACH, M. I. N92-12662
BREIZMAN, B. N. N92-12612
BRINKER, C. J. N92-12119
BRIOSCHI, FRANCESCO N92-12776
BRIOSCHI, FRANSESCO N92-12775
BROOKS, E. D., III N92-12434
BROWMAN, M. J. N92-12262
BROWN, A. P. N92-12120
BROWN, M. D. N92-12694
BROWN, O. N92-12385
BROWN, R. H. N92-12802
N92-12866
BROWNLEE, D. E. N92-12910
BRUMBAUGH, RANDAL W. N92-12528
BUCK, H. M. N92-12629
N92-12630
BUFFMAN, MARTIN N92-12232
BULOU, A. D. F. N92-12605
BUNCH, J. M. N92-12133

BUNCH, T. E. N92-12927
BUNKER, S. N92-12347
BURDICK, ROBERT N92-12525
BURG, RICHARD N92-12948
BURGE, R. N92-12248
BURGMAN, H. A. N92-12196
BURKE, W. R. N92-12009
BURNETT, T. N92-12662
BURTNYK, N. N92-12546
BUSH, E. D. N92-12667
BUSSIERE, J. F. N92-12290
BUTLER, GEOFF N92-12528
BUTLER, M. N92-12165
BUTNER, D. N. N92-12694
BUTTERFIELD, C. P. N92-12037
BUTTON, P. N92-12009
BUTTRAM, M. T. N92-12164
N92-12165
N92-12167
BUZZACCHI, LUIGI N92-12775
N92-12776
N92-12777

C

CAHILL, P. A. N92-12683
CALDI, D. B. N92-12951
CALKOEN, C. J. N92-12378
CALLAHAN, A. P. N92-12411
CAMERON, R. N92-12650
CAMPBELL, D. B. N92-12682
N92-12683
CAMPBELL, D. K. N92-12748
CAMPBELL, DONALD B. N92-12803
CAMPBELL, G. L. N92-12732
CAMPBELL, J. H. N92-12672
N92-12674
CANOT N92-12420
CANTATORE, G. N92-12650
CAO, XIAOWEN N92-12760
CAP, J. S. N92-12661
CAPE, J. N. N92-12356
CAPRIOTTI, D. P. N92-12049
CARBONI, V. B. N92-12190
CAREY, G. F. N92-12446
CARLSON, ANDREW B. N92-12200
CARLSON, J. N92-12771
CARLSTEN, B. E. N92-12262
CARLSTROM, T. N. N92-12732
CARNE, T. G. N92-12281
CAROGLANIAN, ARMEN N92-12185
CARPENTER, MARK H. N92-12556
CARRERAS, B. A. N92-12692
N92-12700
CARSTENS, D. H. W. N92-12076
CARTER, M. D. N92-12736
CARVISH, J. N92-12233
CASANOVA, IGNACIO N92-12909
N92-12911
CASON, B. P. J. N92-12661
CASPER, T. A. N92-12694
N92-12695
CASPI, S. N92-12670
CASSEN, PAT N92-12912
CASTOLDI, A. N92-12187
N92-12188
CATALANO, A. N92-12335
CELONE, PETER J. N92-12470
CHAGELISHVILI, G. D. N92-12940
N92-12941
CHAILLEUX, H. N92-12235
CHAKEL, J. A. N92-12927
CHAKOUMAKOS, B. C. N92-12741
CHAN, KAI-WING N92-12983
CHANDLER, J. F. N92-12682
N92-12683
CHANG, C. Y. N92-12428
CHANG, S. N92-12920
CHANISHVILI, R. G. N92-12940
N92-12941
CHAO, Y. N92-12384
CHAPMAN, C. R. N92-12804
N92-12863
CHAPMAN, GEORGE B. N92-12525
CHARITY, R. J. N92-12653
CHARTAS, GEORGE ATHANASIOS N92-12729
CHARTRAND, F. N92-12058
CHATER, NICK N92-12779
CHEIFETZ, JONATHAN N92-12537
CHEN, CHING-I. N92-12271
CHEN, G. N92-12194
CHEN, J. C. N92-12192
CHEN, J. L. C. N92-12196
CHEN, L. N92-12335
CHEN, S. R. N92-12117
CHEN, ZHAOJIA N92-12762
CHEONG, S. W. N92-12747
CHEREAU, D. N92-12086
CHEREPASHCHUK, A. M. N92-12942
CHIBISOV, G. V. N92-12943
CHIOU, JIN-CHERN N92-12297
CHIRICO, R. D. N92-12769
CHOFFY, J. P. N92-12235
CHORN, G. N92-12442
CHOULY, ANTOINE N92-12152
CHOWDHURY, ABDUR R. N92-12787
CHPOUN, A. N92-11978
N92-11979
CHRISTEN, D. K. N92-12741
N92-12758
CHRISTMAN, R. N92-12442
CHRISTOPHOROU, L. G. N92-12168
N92-12606
CHU, TAK-KIN N92-12677
CHUNG, CHING LUAN N92-12276
CHUNG, CHING-LUAN N92-12274
CHURASOV, E. N92-12970
CHURAZOV, E. N92-12949
CIELO, P. N92-12291
CINOTTI, CIRO N92-12681
CLARK, B. F. N92-12702
CLARK, GEORGE W. N92-12933
N92-12944
CLARK, R. S. N92-12167
CLARK, VICTOR R. N92-12542
CLARKE, D. W. N92-12551
CLAYTON, R. N. N92-12917
CLERE, J. M. N92-12419
CLIFF, R. N92-12667
COAKLEY, T. J. N92-11984
COCHRAN, ANITA L. N92-12805
N92-12864
COCHRAN, H. D. N92-12075
COCHRAN, WILLIAM D. N92-12805
N92-12806
N92-12864
N92-12865
COE, J. A. N92-12323
COEN-PORISINI, ALBERTO N92-12488
COFFEN, CHARLES D. N92-11983
N92-11992
COFFEY, H. T. N92-12280
COFFEY, HELEN E. N92-12980
N92-12981
COLANERI, P. N92-12586
COLE, K. C. N92-12061
N92-12126
COLE, L. N92-12423
COLELLA, N. J. N92-12441
COLLINS, B. N92-12442
COLLINS, CAROL N92-12278
COLOMBO, MASSIMO G. N92-12775
N92-12776
CONG, NGUYEN HUU N92-12567
CONNELLY, J. M. N92-12602
CONNER, D. L. N92-12739
CONNERTON, ROBERT M. N92-12023
COOMES, EDMUND P. N92-12054
COOPER, DAVID G. N92-12251
COOPER, R. H., JR. N92-12656
CORBIN, MALCOLM N92-12528
COUCH, W. A. N92-12148
COURNOYER, L. N92-12234
COX, B. L. N92-12330
COX, R. W. N92-12763
COY, E. N92-12050
COYNE, P. I. N92-12387
CRABBE, R. S. N92-12372
CRAWFORD, D. N92-12195
CRESPI, J. C. N92-12282
CREYGHTON, Y. L. M. N92-12719
CRISP, D. N92-12879
CROSS, G. M. N92-12453
CROSS, J. B. N92-12046
CROSSON, P. R. N92-12354
N92-12355
CROSSON, WILLIAM LEWIS N92-12320
CRUIKSHANK, DALE P. N92-12807
N92-12866
CUADRADO, DIDIER N92-12463
CUMPSON, P. J. N92-12087
CUNEO, M. E. N92-12702
CURLANDER, JOHN C. N92-12428
CURRIE, J. W. N92-12338
CURRO, J. G. N92-12089
CURTIS, L. N92-12161
CUSWORTH, R. A. N92-11996
CUTLER, A. D. N92-12049
CUTTS, D. N92-12435
N92-12444
N92-12659
CYR, REGINALD J. N92-12232

D

DAAN, H. N92-12374
DACLES, JENNIFER SAMSON N92-12205
DAGKESAMANSKY, R. D. N92-12945
DAGLE, JEFFREY E. N92-12054
DAI, J. D. N92-12678
DALE, V. H. N92-12318
DALLEMAGNE, GERARD N92-12311
DALTON, JOHN T. N92-12028
DAMAREN, CHRISTOPHER JOHN N92-12042
DANFORTH, DOUGLAS G. N92-12437
DANTZIG, GEORGE B. N92-12472
DARMSTADTER, J. N92-12353
DASILVA, X. A. N92-12746
DAVID, S. A. N92-12096
N92-12283
DAVIDSON, J. J. N92-12534
DAVIES, MARK N92-12499
DAVIS, D. R. N92-12804
DAVIS, MARC N92-12969
DAVIS, R. I. N92-12533
DAVIS, R. W. N92-12441
DAVIS, RUSS N92-12383
DAYSH, COLIN N92-12528
DEARIEN, J. A. N92-12657
DEBERGH, C. N92-12879
DEBOER, FRANK S. N92-12483
DEBOO, J. C. N92-12732
DECUYPERE, R. N92-12215
DEGOEDE, ERIK D. N92-12487
DEGOEY, L. P. H. N92-12625
N92-12626
N92-12627
DEGROOT, J. S. N92-12691
DEHART, JOHN M. N92-12913
N92-12923
DEHAVEN, R. N92-12248
DEHAVEN, R. A. N92-12667
DEHOOG, F. J. N92-12719
DELPLANCQ N92-12420
DELUCA, W. H. N92-12171
DEMASSIEUX, NICOLAS N92-12490
DEMELENNE, B. N92-12009
DEMERS, SERGE N92-12381
DEMING, DRAKE N92-12808
N92-12809
N92-12867
DENAULT, J. N92-12062
N92-12752
DENG, HUICHEN N92-12725
DENICOLAO, GIUSEPPE N92-12571
N92-12572
N92-12573
N92-12574
N92-12575
N92-12586
N92-12768
DENTON, S. M. N92-12441
DEPATER, I. N92-12687
DEPATER, IMKE N92-12845
DERBYSHIRE, K. R. N92-12009
DESBOUVRIES, FRANCOIS N92-12474
DEVAN, J. H. N92-12097
DEWIT, M. S. N92-12719
DEXTER, JAMES L. N92-12251
DEXTER, R. N. N92-12706
DIAZ, A. C. N92-12783
DIEMUNSCH, JOSEPH R. N92-12542
DIETZ, ANTHONY JOHN N92-12206
DIFILIPPO, F. C. N92-12245
DING, XUANTONG N92-12724
DINI, J. W. N92-12113
DION, M. N92-12153
DIVER, R. B. N92-12324
DOEBEREINER, S. N92-12970
DOGGETT, ROBERT V., JR. N92-11985
DOLMAN, W. C. N92-12467
DOMEY, J. N92-12476
DONAHUE, MEGAN ELIZABETH N92-12896
DONG, JIAFU N92-12725
DONKER, J. C. N92-12538
N92-12544
DONNER, KIMBERLY A. N92-12416
DONOHOE, R. J. N92-12605
DOOLEY, J. B. N92-12098
DORIGO, MARCO N92-12550
N92-12552
N92-12553
DOSS, E. D. N92-12705
DOUGLAS, D. N92-12611
DOXAS, I. N92-12198
DOYLE, R. J. N92-12549

DOZIER, JEFF N92-12431
DRAKE, J. B. N92-12365
DRAPER, JONATHAN N92-12457
DREBING, C. G. N92-12227
DRLIK, M. N92-12694
DUBOULOZ, N. N92-12364
DUEHOLM, K. S. N92-12323
DUERRE, K. H. N92-12493
DUFFIN, PAT N92-12015
DUFFO, G. S. N92-12115
DUKE, EUGENE L. N92-12528
DUNCAN, R. V. N92-12160
DWAN, WEN S. N92-12448

E

EBERSOLE, M. N92-12012
ECK, M. N92-12144
EDDY, T. L. N92-12701
EDENBURN, M. W. N92-12339
EDWARDS, SUZAN N92-12847
EFREMOV, V. V. N92-12949
N92-12970
EGELSTAFF, P. A. N92-12642
EGGER, GOTTFRIED N92-12478
EHST, D. A. N92-12738
EICKE, BERTOLT N92-12560
EISEMEN, S. E. N92-12636
EISLER, G. R. N92-12266
EKMAN, M. E. N92-12092
ELLIOT, JAMES L. N92-12810
ELORANTA, E. W. N92-12686
ENCINIAS, P. D. N92-12076
ENDEBROCK, E. G. N92-12293
ENGLHAUSER, J. N92-12970
ERICKSON, DANIEL E. N92-12432
ERLANDSON, A. C. N92-12703
ERMAK, DONALD L. N92-12343
ERVIN, JAMIE STEVEN N92-12140
ESHEL, MICHAL N92-12537
ESPENAK, F. N92-12875
N92-12876
ESTLER, R. C. N92-12077
ESTREICHER, S. K. N92-12757
ETKIN, A. N92-12636
EVANKO, R. G. N92-12732
EVANS, J. N92-12732

F

FAENGMARK, INGRID N92-12399
FAHR, A. N92-12289
FAIDAS, H. N92-12168
N92-12606
FALKOWSKI, PAUL G. N92-12381
FARRELL, MICHAEL P. N92-12342
FAULKNER, D. N92-12424
FAVIS, B. D. N92-12124
N92-12127
FEDDEMA, J. T. N92-12266
FEENSTRA, R. N92-12765
FEIGELSON, ROBERT S. N92-12141
FELDMAN, D. L. N92-12350
FELDMAN, URI N92-12250
FENSTERMACHER, M. N92-12695
FERBER, M. K. N92-12131
FERGUSON, P. D. N92-12640
FERNANDEZ, J. P. N92-12292
FERNANDEZDELAMORA, G. N92-12458
FERRAND, ANDRE N92-12238
FEY, J. N92-12536
FIESELMANN, B. N92-12335
FILIPPENKO, ALEXEI V. N92-12946
FINK, UWE N92-12811
FINTEL, BRADLEY W. N92-12199
FISHER, P. W. N92-12734
FISHER, R. A. N92-12742
N92-12744
FISK, W. J. N92-12424
FISK, Z. N92-12747
FITCH, J. P. N92-12516
FLEMING, R. H. N92-12927
FLEXSER, S. N92-12330
FLOWER, E. C. N92-12314
FLYNN, E. R. N92-12740
FOGEL, NOAM N92-12537
FOKKINGA, MAARTEN M. N92-12484
FOLEY, K. J. N92-12636
FONG, ROGER N92-12017
FOOTE, J. N92-12695
FOREST, CHARLES A. N92-12224
FORSMAN, MATS N92-12393
N92-12394
N92-12395
N92-12396
N92-12397
N92-12398
FOSTER, B. N92-12062
FOSTER, C. A. N92-12053
FOTOPOULOS, SOPHIA S. N92-12402
N92-12403
FRAEDRICH, WERNER M. N92-12451
FRANK, M. V. N92-12039
FRANKS, G. N92-12131
FREEMAN, D. N92-12116
FRENCH, J. B. N92-12609
FRENSCH, HEINO N92-12129
FREUND, F. N92-12906
FREUND, FRIEDEMANN N92-12083
FRIAR, J. L. N92-12645
FRIEDLAND, PETER N92-12032
FROLOFF, WALT N92-12033
FRYE, G. C. N92-12119
FRYXELL, BRUCE N92-12934
FU, BO N92-12725
FUGEL, KLAUSDIETER N92-12034
FUKUDA, TSUGIHIRO N92-12221
FULLER, J. E. N92-12110
FULLER, P. N92-12330

G

GAIGNEBET, JEAN N92-12255
GAMMEL, J. T. N92-12605
N92-12764
GAMPE, JUTTA N92-12407
GANNAWAY, MARY T. N92-12048
GAPENNE, OLIVIER N92-12414
GARAVAGLIA, T. N92-12668
GAREM, H. N92-11981
GARMAN, JOHN R. N92-12498
GARNER, P. L N92-12222
GARRISON, D. H. N92-12907
N92-12914
GARTEN, C. T., JR. N92-12356
GARVIS, D. N92-12258
GATEWOOD, GEORGE D. N92-12812
GATHERS, G. R. N92-12229
N92-12230
GATTI, E. N92-12187
N92-12188
GAUDERT, P. C. N92-12059
GEDALIN, M. E. N92-12947
GEHRELS, TOM N92-12813
N92-12868
GEIS, N. N92-12242
GELBARD, E. M. N92-12222
GENZEL, REINHARD N92-12242
N92-12974
GEOHEGAN, D. B. N92-12737
GEORGE, ALBERT R. N92-11983
N92-11992
GEYER, H. K. N92-12705
GHOSH, ASISH N92-12132
GIACCONI, RICCARDO N92-12948
GIBSON, E. K. N92-12917
N92-12928
GIBSON, J. N92-12854
N92-12894
GIESEKE, B. N92-12118
GILFANOV, M. N92-12949
N92-12970
GILIBERT, YVON N92-12068
N92-12069
GILL, J. T. N92-12759
GILLIE, K. R. N92-12171
GINLEY, D. S. N92-12749
GINSBURG, GUSS N92-12500
GIRARD, M. N92-11972
GLASS, I. I. N92-11974
GLASSON, DOUGLAS P. N92-12529
GLOECKLE, W. N92-12626
N92-12627
GNEDIN, YU. N. N92-12950
GOBERT, JEAN N92-12490
GOELTZ, R. N92-12774
GOERLICH, HORST N92-12589
GOETHALS, CHRISTOPHE N92-12465
GOETZ, J. A. N92-12706
GOLDSTEIN, J. N92-12876
GOLDSTEIN, N. N92-12330
GONZALES, R. P. N92-12672
GOODING, JAMES L. N92-12929
N92-12930
GOODWIN, M. N92-12423
GOTTESDIENER, L. N92-11979
GOTTLIEB, DAVID N92-12556
GOULDING, R. H. N92-12736
GRABE, W. N92-11998
N92-12000
N92-12233
GRADY, J. E. N92-12063
GRAHAM, CHARLES N92-12402
N92-12403
GRAHAM, DARIN P. W. N92-12154
GRAHAM, M. J. N92-12344
GRAMBOW, K. N92-12461
GRANDJEAN, CLAUDE N92-12465
GRANIER, A. N92-12086
GRANSTROEM, MICHEAL N92-12397
GRAY, WILLIAM M. N92-12376
N92-12377
GREBENEV, S. A. N92-12970
GREEN, D. N92-12547
GREEN, M. A. N92-12669
GREEN, R. A. N92-12699
GREENE, D. L. N92-12134
GREENE, G. A. N92-12192
GREENE, THOMAS PETER N92-12790
GREENFIELD, C. M. N92-12732
GREENWOOD, D. N92-12172
GREGORY, D. C. N92-12688
GRIMSHAW, JEFFREY D. N92-12519
GROENENBOOM, GERRIT CORNELIS N92-12628
N92-12629
N92-12630
N92-12631
N92-12632
GRONDIN, G. N92-12580
GROOTE, JAN FRISO N92-12480
GROSSMANN, J. M. N92-12166
GRUENEWALD, ALFRED N92-12003
GRUENEWALD, W.-J. N92-12459
GUELPIN, JOACHIM N92-12044
GUIMARARES, A. P. N92-12746
GUINAN, M. N92-12710
GUPTA, YASHWANT N92-12791
GUREVICH, A. V. N92-12935
N92-12936
GUSTAFSON, STEVEN C. N92-12530
GUSTAVSSON, LARS N92-12599
GUTH, ALAN H. N92-12951
GUTOWSKI, WILLIAM J. N92-12367

H

HAAS, JEAN-FRANCOIS N92-12225
HABENSCHUSS, A. N92-12089
HACK, J. J. N92-12365
HACKENBURG, R. W. N92-12636
HAEGGSTROEM, BRITTA N92-12394
N92-12395
N92-12396
HAGAN, P. S. N92-12763
HAGGERTY, M. N92-12242
HAINES, EDWARD JOSEPH N92-12728
HAINES, RICHARD F. N92-12033
HAJARE, ANKUR R. N92-12501
HALAMA, H. N92-12650
HALL, DONALD N. B. N92-12814
HALLER, E. E. N92-12242
HALLER, K. N92-12951
HALPERN, D. N92-12384
N92-12385
HAMAMATSU, TERUHIDE N92-12197
HAMEL, W. N92-12265
HAN, GUCHANG N92-12761
N92-12762
HANNER, MARTHA S. N92-12815
HANSELMANN, H. N92-12462
HANSEN, ELAINE R. N92-12026
HARA, SABURO N92-12197
HARDINGE, HAL N92-11983
HARJES, H. C. N92-12164
N92-12165
HARPER, C. L. N92-12915
N92-12925
HARRINGTON, ROBERT S. N92-12816
HARRIS, ALAN W. N92-12817
HARRIS, D. B. N92-12259
N92-12731
HARRIS, D. W. N92-12927
HARRIS, H. W. N92-12667
HARRIS, J. L. N92-11966
HART, A. T. N92-12699
HARTMANN, W. K. N92-12866
HARTMANN, WILLIAM K. N92-12818
HARTZ, WILLIAM G. N92-12430
HARVEY, E. H., JR. N92-12495
HASAN, A. N92-12411
HASKOVEC, J. S. N92-12732
HASSLER, DONALD M. N92-12977
HASTA, JUZAR N92-12505
HATORI, TADATSUGU N92-12707
HATTIS, PHILIP D. N92-12002
HAVERLAG, M. N92-12721

HAWKINS, C. F. N92-12189
HAWKINS, D. B. N92-12759
HAWKINS, R. J. N92-12671
HAYNES, GERALD N92-12926
HAYNES, RENA A. N92-12514
HAYTON, G. E. N92-12554
HAZZLEDINE, P. M. N92-12112
HE, J. L. N92-12280
HEARD, DAVID N92-12780
HEBERLE, D. P. N92-12326
HECHLER, JEAN-JACQUES N92-12106
N92-12352
HEDLEY, J. P. N92-12558
HEEG, JENNIFER N92-12173
HEEG, PETER N92-12618
HEFFNER, K. S. N92-11978
HEIJMANS, H. J. A. M. N92-12479
HEINDEL, TROY A. N92-12025
HEL-OR, Y. N92-12405
HELFAND, DAVID J. N92-12952
HELIN, ELEANOR F. N92-12819
N92-12869
HELM, M. N92-12670
HELM, ULRICH N92-12617
HELMERS, R. N92-12582
HEMKER, P. W. N92-12570
HENAGER, C. H., JR. N92-12132
HENDERSON, C. L. N92-12189
HENDRIKS, MAXIMILIAAN ALEXANDER NICOLAAS
N92-12304
HENDRIX, C. N92-12685
HENRICHFREISE, H. N92-12462
HERBST, T. N92-12903
HERZOG, G. F. N92-12914
HEWETT, JOANNE L. N92-12648
HEWITT, JACQUELINE N. N92-12953
HIGDON, J. C. N92-12966
HILL, JERRY N92-12011
HILL, N. W. N92-12610
HINE, A. A. N92-12882
HINGORANI-NORENBERG, S. L. N92-12135
N92-12136
HIRSCHHEIM, RUDY N92-12507
HISSEN, H. N92-12662
HO, H. N92-12306
HO, JAMES K. N92-12472
HO, JIN-MENG N92-12597
HOAG, J. E. N92-12434
HOCH, SIGRID N92-12594
HOCHARD, L. N92-12086
HODAPP, T. R. N92-12733
HODGETTS, T. E. N92-12158
HOEKSTRA, R. N92-12595
HOFFMANN, KLAUS N92-12182
HOFTUN, J. H. N92-12435
HOFTUN, J. S. N92-12444
HOGREFE, R. L. N92-12171
HOH, R. N92-11988
HOKIN, SAMUEL N92-12729
HOLDEN, KRITINA L. N92-12416
HOLLA, K. N92-12535
HOLLANDER, S. N92-12521
HOLMES, J. A. N92-12692
HOLST, HARTMUT N92-12005
HOLT, R. T. N92-12058
HOLTKAMP, D. B. N92-12441
HOLTROP, K. L. N92-12733
HOMEM-DE-MELLO, L. S. N92-12549
HOMSY, G. M. N92-12207
HONG, TSAI-HONG N92-12319
HONNELL, K. G. N92-12089
HOOPER, E. N92-12695
HOOPER, E. B. N92-12690
HOOVER, C. G. N92-12095
HOOVER, W. G. N92-12095
HOP, RENE MICHAEL N92-12303
HORTON, W. N92-12198
HORZ, FRIEDRICH N92-12910
N92-12926
HOWARD, J. N92-12697
HOWELL, BARBARA N92-12057
HOWELL, ROBERT R. N92-12820
N92-12870
HOWELL, S. B. N92-12804
HSIEH, C. L. N92-12732
HU, T. C. J. N92-11996
HU, Y. F. N92-12577
HUANG, P. G. N92-11984
HUANG, SUNLI N92-12760
HUBBARD, B. N92-12838
HUBBARD, C. R. N92-12100
N92-12131
HUBBARD, W. B. N92-12821
N92-12871
HUDSON, R. S. N92-12882
HUEBLER, A. N92-12578
HUETTER, THOMAS N92-12561
HUFFLEN, JEAN-MICHEL N92-12456
HUGHES, PETER M. N92-12028
HUGHES, R. C. N92-12227
HUNG, R. J. N92-12279
HUNTEN, D. M. N92-12822
HUO, YUPING N92-12723
HURLEY, K. N92-12954
HURST, G. S. N92-12244
HUTSON, L. N92-12249

I

IACONO, MICHAEL J. N92-12367
IANNARELLA, L. N92-12746
ICHIKAWA, YOICHI N92-12345
IKHSANOV, N. R. N92-12950
INFANGER, GERD N92-12472
INGOLD, G. N92-12743
INUMARU, JUN N92-12197
IORIO, A. F. N92-12282
IRVINE, T. F., JR. N92-12192
ISLAM, M. M. N92-12951
ISTOMIN, YA. N. N92-12935
N92-12936
ITOH, KIMITAKA N92-12708
IVANCIC, WILLIAM D. N92-12151
IVENS, W. N92-12356

J

JACAK, B. V. N92-12646
JACCARD, D. N92-12742
JACKSON, ERIC N92-12523
JACKSON, G. L. N92-12733
JACKSON, J. N92-12242
JACKSON, WILLIAM M. N92-12823
N92-12872
JAECKEL, LOUIS A. N92-12436
JAEGER, D. L. N92-12133
JAEGER, E. F. N92-12726
JAEHNE, BERND N92-12378
N92-12379
JAKOB, R. N92-12365
JAMES, R. D. N92-12071
JAMET, J. F. N92-12064
JANCAITIS, K. S. N92-12703
JANSEN, J. F. N92-12265
JANSEN, P. S. M. KOP N92-12625
JANSSEN, A. M. L. N92-12624
JANSSEN, J. A. M. N92-12378
JANSSENS, R. V. F. N92-12647
JARDIN, S. C. N92-12730
JARLSKOG, G. N92-12663
JARRETT, OLIN, JR. N92-12049
JASPER, G. L. N92-12375
JAURIN, BENGTAKE N92-12394
N92-12395
N92-12396
N92-12398
JEN, C. K. N92-12290
N92-12678
N92-12679
JEROME, JOSEPH W. N92-12557
JETT, J. H. N92-12249
JIANG, Z. Y. N92-12743
JIAO, XINPING N92-12761
N92-12762
JIN, HUA N92-12985
JOHNSON, A. S. N92-12662
JOHNSON, AMOS STEVE N92-12415
JOHNSON, C. R. N92-12435
N92-12444
JOHNSON, C. S. N92-12228
JOHNSON, GLENN N92-12525
JOHNSON, M. R. N92-12440
JOHNSON, RICHARD A. N92-12287
JOHNSON, ROGER L. N92-12029
JOHNSON, VICKI N92-12033
JOHNSTON, L. P. N92-12424
JONES, E. R. LL. N92-12554
JONES, J. H. N92-12916
JONES, M. E. N92-12166
N92-12247
JULL, A. J. T. N92-12928
JUREWICZ, A. J. G. N92-12916
JURGENS, RAYMOND F. N92-12824
N92-12873

K

KACPRZYNSKI, J. J. N92-11997
N92-12305
KADISH, A. N92-12169
KAKHIDZE, G. P. N92-12955
KAMMERAAD, J. E. N92-12666
KANCIRUK, PAUL N92-12342
KANE, THOMAS J. N92-12149
KANIOVSKIY, A. N92-12949
KANIOVSKY, A. S. N92-12970
KARLSSON, H. R. N92-12917
N92-12928
KAROV, YAEL N92-12537
KASCHIMITTER, J. L. N92-12441
KASHYAP, S. N92-12153
KAST, B. A. N92-12602
N92-12685
KATAYAMA, MASAHITO N92-12221
KATO, HIROYUKI N92-12346
KATTI, ROMNEY R. N92-12438
KAUFFMAN, L. N92-12591
KAWAS-KALEH, GHASSAN N92-12473
KAY, B. D. N92-12074
KAZBEGI, A. Z. N92-12956
KEDL, R. J. N92-12325
KEIL, KLAUS N92-12909
KELECY, THOMAS MATTHEW N92-11987
KELLER, LINDSAY P. N92-12918
N92-12919
KELLY, S. M. N92-12513
KENNEDY, R. N92-12258
KERBER, DIRK N92-12156
KERCHNER, H. R. N92-12741
N92-12758
KERCZEWSKI, ROBERT J. N92-12151
KERELIUK, S. N92-11988
KERSTEN, H. N92-12721
KESSEL, C. E. N92-12730
KHALID, M. N92-12213
KHAN, S. N92-12458
KHODA, K. M. N92-12491
KHOO, TENG LEK N92-12647
KIELHORN, P. N92-12455
KIM, J. H. N92-12196
KIMBROUGH, J. R. N92-12441
KINDLE, C. H. N92-12337
KINSEY, J. N92-12738
KIRSCH, L. E. N92-12604
KIRSHNER, ROBERT P. N92-12957
KISSIN, GLORIA N92-12186
KLATT, L. N. N92-12088
KLEIN, MICHEL L. L. N92-12068
N92-12069
KLIEM, B. N92-12982
KLINGLESMITH, DANIEL A., III N92-12836
N92-12874
KNACKE, ROGER N92-12825
KNAPP, F. F., JR. N92-12411
KNIPMEYER, S. E. N92-12769
KOBAYASHI, A. S. N92-12132
KOBLER, BEN N92-12433
KOCH, U. N92-12108
KOEHLER, H. N92-12590
KOELMAN, J. M. V. A. N92-12622
N92-12624
KOENBERG, MATS N92-12147
KOLTUN, D. S. N92-12609
KOMHYR, WALTER D. N92-12371
KOMOROWSKI, J. P. N92-12123
KOONTZ, S. L. N92-12046
KOOPMANN, HANS JUERGEN C. N92-12588
KOREN, B. N92-12570
KOROLIUK, V. V. N92-12564
KOSTEN, SUE E. N92-12231
KOSTIUK, THEODOR N92-12826
N92-12875
N92-12876
KOURAKIS, I. N92-12649
KOWALCHUK, NICK P. N92-12518
KOWALCYZK, T. C. N92-12683
KOZLOWSKI, M. R. N92-12672
N92-12674
KOZUBAL, A. J. N92-12261
KRAPEZ, J. C. N92-12291
KRESS, R. N92-12265
KRISHNAPPA, G. N92-11999
KROESEN, G. M. W. N92-12716
N92-12717
N92-12719
N92-12721
KRUEGER, A. N92-12982
KUCERA, G. H. N92-12120
KUEHL, P. N92-12455
KUEHN, DAVID MATTHEW N92-12976
KUIJPER, M. N92-12563
KULAGA, J. E. N92-12171
KULP, T. J. N92-12258
KUNZ, INGO N92-12713
KUNZ, P. F. N92-12662
KUPPERMAN, D. S. N92-12756

KURNIT, N. A. N92-12259
KURTH, R. E. N92-12306
KUTSCHER, J. N92-12459
KUZNETSOV, A. V. N92-12949
N92-12970

L

LAAMOURI, ABDELHAMID N92-12753
LAASANEN, A. N92-12655
LABATT, EARL C., JR. N92-12541
LABORIE, MARTINE N92-12146
LABURTHE, F. N92-12210
LADEN, T. N92-12216
LADERACH, G. E. N92-12165
LAGARDE, DIDIER N92-12414
LAI, K. Y. M. N92-12214
LAKSO, H. A. N92-12084
LAMBERT, C. R. N92-12411
LAMBERT, S. J. N92-12411
LAN, E. H. N92-12046
LANGBERG, HELGE N92-12310
LANIER, A. B. N92-12923
LANOU, R. E., JR. N92-12659
LARJOLA, JAAKKO N92-12331
LARSON, STEPHEN M. N92-12827
N92-12877
LASLETT, L. J. N92-12670
LASNIER, C. N92-12695
LASSANYI, RUBY A. N92-12784
LASSILA, D. H. N92-12116
LAUNAY, JEAN-CLAUDE N92-12755
LAURANCE, M. N92-12910
LAZARUS, D. N92-12650
LE, L. N92-12916
N92-12924
LEBLANC, L. N92-11990
LEBLANC, R. N92-11981
N92-12215
LEBOEUF, J. N. N92-12692
LEBOFSKY, LARRY A. N92-12828
N92-12878
LEE, CHEE-SENG N92-12506
LEE, CHUNG M. N92-12091
LEE, D. K. N92-12692
LEE, I.-YANG N92-12986
LEE, MARK N92-12504
LEE, RAN-RONG N92-12131
LEE, S. N92-12059
LEE, S. DANIEL N92-12781
LEE, W. N92-12051
LEE, YIN-NAN N92-12348
LEENHEER, ROB N92-12665
LEFLOCH, CHRISTIAN N92-12067
LEGENDRE, LOUIS N92-12381
LEGGETT, P. J. N92-12009
LEHUY, H. N92-12107
LEJEUNE, D. N92-12419
LEMOINE, MICHEL N92-12456
LENGRAND, J. C. N92-11978
N92-11979
LEPRINCE, P. N92-12086
LERNER, N. R. N92-12920
LESPERANCE, G. N92-12058
N92-12107
LEVINE, D. M. N92-12321
LEVY, C. D. P. N92-12248
LEWIN, WALTER H. G. N92-12933
N92-12958
LI, LINZHONG N92-12723
LI, QIAOZHEN N92-12094
LI, QIRUI N92-12724
LI, WEI-WEI N92-12041
LI, Y. N92-12335
LI, ZHUANG N92-12132
LIANG, XIN-ZHONG N92-12367
LIE, IVAR N92-12386
LIN, H. Q. N92-12748
LINDBERG, S. E. N92-12356
LINDENBAUM, S. R. N92-12636
LINDGREN, LENA N92-12395
N92-12396
LINDGREN, OLLI N92-12331
LINDSEY, C. N92-12652
LINDSTROM, D. J. N92-12921
LINDSTROM, MARILYN M. N92-12922
LINKOUS, R. L. N92-12088
LIPUNOV, V. M. N92-12959
LISCANO, R. N92-12547
LISS, JUERGEN N92-12155
LITTLE, GORDON R. N92-12530
LIU, K. C. N92-12315
LIU, L. C. N92-12641
LIU, ZETIAN N92-12724
LIZZA, CARL S. N92-12531
LOCKNER, T. R. N92-12702
LOEFGREN, PEJE N92-12601
LOFFTUS, D. A. N92-12699
LOFGREN, GARY E. N92-12913
N92-12923
LOLLAR, L. F. N92-12052
LOMINADZE, J. G. N92-12940
N92-12941
N92-12947
LONGACRE, R. S. N92-12636
LONGONI, A. N92-12187
N92-12188
LOPEZ, J. N92-12249
LOUBRIEL, G. M. N92-12163
N92-12190
LOUIE, A. N92-12153
LOVE, W. A. N92-12636
LOVESEY, E. J. N92-12533
LOVETRI, JOE N92-12154
LOWDEN, R. A. N92-12071
LOWDEN, RICHARD A. N92-12055
LOWERS, BENJAMIN N92-12447
LOWNDES, D. H. N92-12765
N92-12766
LOZINSKAYA, T. A. N92-12937
LOZNIKOV, V. N92-12949
LU, PEICHENG N92-12114
LU, XUANHUI N92-12246
LUGER, GEORGE F. N92-12522
LUKEN, ROBERT N92-12013
LUND, GLENN N92-12255
N92-12256
LUTTMANN, HELMUT N92-12043
LUTZ, BARRY L. N92-12829
N92-12879
LYNCH, V. E. N92-12692
LYNGNES, OVE N92-12254

M

MACGREGOR, D. G. N92-12774
N92-12782
MACHABELI, G. Z. N92-12956
MACHIN, GRAHAM N92-12897
MACLEOD, JAMES D. N92-12001
MAGNESS, F. N92-12116
MAGUSIN, O. N92-12543
MAIER, W. B., II N92-12169
MAIGRET, J. P. N92-12308
MAILLARD, J.-P. N92-12879
MAJUMDAR, S. N92-12756
MALCHOW, HARVEY L. N92-12002
MALDAGUE, X. N92-12291
MALDARELLI, C. N92-12223
MALDONADO, JAIME J. N92-11995
MALLETT, R. L. N92-12951
MANAHAN, MEERA K. N92-12416
MANGAN, D. L. N92-12228
MANN, G. A. N92-12164
MANNHEIM, P. D. N92-12951
MANSEL, W. N92-12536
MARANGOS, J. N92-12536
MARGOLIN, L. G. N92-12314
MARGON, BRUCE N92-12960
MARKOWITZ, VICTOR M. N92-12785
MAROTTE N92-12420
MARSDEN, B. G. N92-12830
MARSTERS, G. F. N92-11991
MARTI, K. N92-12581
MARTIN, J. C. N92-12249
MARTIN, M. N92-12308
MARTINEZ, A. N92-12249
MARTINEZ, L. N92-12164
N92-12165
MARTINEZ, S. L. N92-12119
MASON, R. J. N92-12166
MASSINES, F. N92-12125
MASSONI, JEAN ALAIN N92-12681
MATTHEWS, C. N. N92-12866
MATTHEWS, K. N92-12831
N92-12880
MATTIS, M. P. N92-12644
MATTISSEK, A. N92-12469
MAY, M. W. N92-12261
MAYEDA, T. K. N92-12917
MAYER-KRESS, G. N92-12578
MAZIASZ, P. J. N92-12100
MAZUMDAR, S. N92-12748
MCCARTY, K. F. N92-12747
MCCOOEYE, M. N92-12372
MCCORKLE, D. L. N92-12606
MCCOY, J. D. N92-12089
MCCRORY, F. M. N92-12294
MCDONALD, H. N92-12273
MCDOUGALL, J. M. N92-11999
MCENTEE, J. N92-12194
MCGRAIN, M. N92-12704
MCINTOSH, R. E. N92-12159
MCINTYRE, P. M. N92-12664
MCKAMEY, C. G. N92-12100
MCKAY, DAVID S. N92-12918
N92-12919
MCKAY, G. N92-12924
MCKEAN, MICHAEL ELLIOTT N92-12978
MCKEE, E. L. N92-12732
MCKENNEY, B. L. N92-12704
MCLAUGHLIN, D. L. N92-12163
MCLEOD, J. N92-12259
MCMILLAN, ROBERT S. N92-12632
N92-12868
MCMILLIN, P. L. N92-12257
MCNEEL, P. J. N92-12424
MCPHERSON, D. W. N92-12411
MEAD, J. B. N92-12159
MECHOSO, C. R. N92-12384
MEECH, KAREN J. N92-12833
N92-12881
MEEUSEN, G. J. N92-12721
MEI, V. C. N92-12226
MEIER, H. N92-12009
MEIER, W. R. N92-12696
MEIJER, ERIK N92-12484
MELIKIDZE, G. I. N92-12956
MELIORANSKIY, A. N92-12949
MELISSINOS, A. C. N92-12650
MENKIN, IRENE N92-12537
MENLOVE, H. O. N92-12639
MERCIER, C. W. N92-12442
N92-12515
MERCIER, V. N92-12215
MERIIN, B. V. N92-12275
MERKLE, DIETRICH N92-12680
MERX, M. N92-12536
MESSERSCHMIDT, D. N92-12374
MEURS, E. J. A. N92-12984
MEYER, M. N92-12108
MEYER, W. H. N92-12694
N92-12695
MICHAELIS, HORST N92-12034
MICHELI, F. N92-11980
MICHELSEN, RANDY E. N92-12512
MICHIE, R. B. N92-12257
MIDDELDORP, AART N92-12485
MIHALCZO, J. T. N92-12610
MIKKALSON, J. E. N92-12167
MILLER, M. C. N92-12639
MILLER, M. L. N92-12909
MILLIS, ROBERT L. N92-12834
MILLS, D. N92-12292
MILORA, S. L. N92-12053
MINGES, MARK E. N92-12539
MINGUEZ, R. N92-12458
MINTZ, M. M. N92-12788
MIRZADEH, S. N92-12411
MITCHELL, M. A. N92-12749
MITCHELL, T. N92-12494
MITCHUM, MARIA V. N92-12309
MITTMAN, DAVID N92-12278
MIZUNO, K. N92-12691
MO, TSAN N92-12317
MOLENAAR, J. N92-12566
MOLINERO, I. N92-12235
MOLLER, J. M. N92-12694
N92-12695
MOLLEY, P. A. N92-12602
MONNIER, J. C. N92-12216
MONSLER, M. J. N92-12696
MONTGOMERY, EDWARD E. N92-12447
MOORE, ALAN N92-12466
MOORE, G. N92-12593
MOORE, R. H. N92-12661
MOORES, T. C. N92-12467
MOORHEAD, DEBORAH N92-12017
MORE, K. N92-12131
MORELLI, EUGENE ARCANGELO N92-11989
MORENO, J. B. N92-12324
MORGAN, A. J. N92-12672
MORGAN, F. A. N92-12164
MORGAN, G. H. N92-12596
MORGAN, T. H. N92-12884
MORGAN, THOMAS N92-12839
MORISSEAU, PHILIPPE N92-12145
MOROSIN, B. N92-12749
MORRIS, M. N92-12494
MORRIS, T. W. N92-12636
MORRISON, I. R. N92-12543
MOSS, T. A. N92-12324
MOSSBACHER, BERNHARDT N92-12681
MOUAT, M. N92-12248
MUELLER, ARNOLD W. N92-12598
MUELLER, BEATRICE N92-12797

MUELLER, EDGAR N92-12509
MUELLER, EWALD N92-12934
MUELLER, HUBERT N92-12003
MUIR, P. F. N92-12267
MUKUNDA, M. N92-12144
MULLINS, BARRY E. N92-12468
MUMMA, M. J. N92-12875
MUNKELWITZ, H. R. N92-12767
MURATORE, JOHN F. N92-12019
MURRAY, J. E. N92-12703
MUSHOTZKY, RICHARD N92-12961
N92-12962
MUTH, B. N92-12455
MYHILL, ELIZABETH ANNE N92-12898
MYKLEBUST, R. L. N92-12072

N

NABORS, TERRI L. N92-12447
NADYOSHIN, D. K. N92-12939
NAGASAKI, KAZUNOBU N92-12708
NAKACHE, J. M. N92-12322
NAPIER, A. N92-12443
NAPIERALSKA, MALGORZATA N92-12179
NARTEN, A. H. N92-12089
NEAL, D. R. N92-12257
NEAU, E. L. N92-12164
N92-12165
NELSON, B. E. N92-12739
NELSON, N. M. N92-12191
NESIC, D. N92-12435
N92-12444
NETHE, ARNIM N92-12180
NEUMANN, W. E. N92-12009
NEWBURN, RAY L., JR. N92-12835
NEWBURY, D. E. N92-12072
NEWELL, J. F. N92-12306
NEWMAN, J. N92-12385
NEWTON, J. N92-12335
NGO, KIM CHI T. N92-12174
NGUYEN, A. N92-12769
NICKS, J. N92-11999
NIEDNER, MALCOLM B., JR. N92-12836
N92-12874
NIETO, M. M. N92-12770
NILSON, D. N92-12695
NISHIMURA, Y. N92-11975
N92-11976
NISHINOMIYA, SAKAE N92-12346
NITTA, AKITO N92-12099
NOEL, DENIS N92-12061
N92-12126
N92-12352
NOFFSINGER, KENT E. N92-12054
NOGAR, N. S. N92-12077
NOLL, K. S. N92-12825
NORDHOFF, MANFRED N92-12589
NORTHAM, G. BURT N92-12049
NORTON, D. P. N92-12765
N92-12766
NORWOOD, D. N92-12111
NOVICH, B. E. N92-12131
NOYES, H. P. N92-12555
NYQUIST, L. E. N92-12915
N92-12925

O

OGATA, TAKASHI N92-12099
OHARA, FREDERICK M., JR. N92-12342
OKUMA, TAKAHIRO N92-12209
OLIVEIRA, J. E. B. N92-12679
OLIVERSEN, R. J. N92-12874
OMALLEY, M. W. N92-12163
N92-12190
OMEARA, JACQUIE N92-12278
OOST, W. A. N92-12378
N92-12380
OSMINKIN, E. YU. N92-12959
OSOWSKI, J. J. N92-12493
OSSANDON, J. G. N92-12741
OSSARD, G. N92-12419
OSTRO, STEVEN J. N92-12837
N92-12882
N92-12883
OTTINGER, P. F. N92-12166
OUCHI, KATSUNORI N92-12209
OVERTON, W. C., JR. N92-12740
OWEN, RICH N92-12030
OWEN, T. N92-12879
OWENSBY, C. E. N92-12387

P

PADFIELD, GARETH D. N92-12466
PAGE, R. K. N92-12454
PAILHAS, G. N92-12211
PAL, S. N92-12051
PALAMIDESSI, CATUSCIA N92-12483
PALMER, B. J. N92-12633
PALMER, D. A. N92-12090
PALMER, PATRICK N92-12845
N92-12887
PAN, HONGCHAO N92-12789
PANCHAL, C. N92-12336
PARAMESWARAN, THANGAM N92-12085
PARE, V. K. N92-12610
PARESCE, FRANCESCO N92-12904
PARKER, F. R. N92-12193
PARKER, G. B. N92-12338
PARKINSON, W. J. N92-12493
PARKS, KATHERINE D. N92-12689
PARSONS, M. N92-12667
PARTOUCHE, ELIE N92-12237
PATTERSON, P. E. N92-12167
PAYNE, B. N92-12423
PAZMANY, A. L. N92-12159
PENDERGRASS, J. H. N92-12259
PERES, P. N92-12064
PEREZ, R. B. N92-12245
PERILLO, P. M. N92-12115
PERKINS, M. N92-12241
PERLACK, R. D. N92-12328
PERRY, M. L. N92-12868
PETERS, STEPHEN N92-12278
PETERSEN, DON N92-12502
PETERSEN, P. I. N92-12733
PETERSON, ETTA N92-12920
N92-12926
PETERSON, JOHN B., JR. N92-12007
PETROSKY, LYMAN J. N92-12272
PEYRARD, M. N92-12649
PEYTON, B. W. N92-12579
PFUND, D. M. N92-12075
PHILLIPS, J. N92-12733
PHILLIPS, N. E. N92-12742
N92-12744
PICHE, L. N92-12125
N92-12290
PIEPHO, M. G. N92-12220
PIERS, M. A. N92-12538
PIH, D. N92-12424
PIN, F. G. N92-12268
PINCOSY, P. A. N92-12172
PINEDADEGYVEZ, JOSE DE JESUS N92-12175
PIRODDI, L. N92-12573
PITARYS, MARC J. N92-12540
PIXTON, R. M. N92-12190
PLATNER, E. D. N92-12636
PLIMPTON, S. J. N92-12072
PLOTARD, PATRICE N92-12065
PODGORSKI, A. S. N92-12711
N92-12712
PODLESNY, R. N92-12335
POGLITSCH, A. N92-12242
POLLARD, R. D. N92-12241
POLYCHRONAKOS, A. P. N92-12359
PONSE, ALBAN N92-12480
PORCO, CAROLYN C. N92-12838
POST, GERARDUS JACQUES JOHANNES N92-12772
POSTNOV, K. A. N92-12963
N92-12964
POTTELETTE, R. N92-12364
POTTER, A. E. N92-12884
POTTER, ANDREW N92-12839
POTTER, J. E. N92-12702
POULSEN, P. N92-12172
POUSSART, D. N92-12291
POWELL, H. T. N92-12703
PRADELLA, SYLVIANE N92-12414
PRAGER, S. C. N92-12706
PREECE, ROBERT DWIGHT N92-12899
PRESS, WILLIAM H. N92-12965
PRETEUX, FRANCOISE N92-12405
PROKHOROV, M. E. N92-12959
N92-12963
N92-12964
PRUESS, K. N92-12330
PRUVOST, M. N92-12006
PU, NUPING N92-12094
PUGH, A. C. N92-12554
PUJOLS, H. C. N92-12036
PURASSANTA, D. N92-12573
PURVIS, ANDREW LEE N92-12101

Q

QIANG, YIZHONG N92-12094
QIU, YANPING N92-12056
QUELLETTE, D. N92-12131

R

RABAS, T. N92-12336
RABINOWITZ, D. L. N92-12868
RADICATIDIBROZOLO, F. N92-12927
RAFFIN, M. N92-11979
RAINER, F. N92-12672
RANDALL, D. A. N92-12369
N92-12370
RATHI, A. N92-12134
RAY, DEMPSEY B. N92-12351
RAY, L. P. N92-12264
RAZANI, A. N92-12135
N92-12136
RAZI, HAMID N92-12299
READER, JOSEPH N92-12250
REED, K. W. N92-12164
N92-12165
REED, R. W. N92-12096
REESE, THOMAS F. N92-12464
REIBLING, LYLE A. N92-12527
REIN, D. N92-12663
REINTJES, JOHN F. N92-12251
REMO, JOHN L. N92-12676
RENAULT, HERVE N92-12256
RENSCHLER, C. L. N92-12759
RICARD, A. N92-12086
RICE, B. N92-12695
RICE, D. E. N92-12411
RICH, DAVID O. N92-12512
RIDDER, SVEN-OLOF N92-11993
RIEGER, D. N92-12111
RIEMER, KLAUS S. N92-12379
RIETHMULLER, M. N92-12215
RIGBY, M. J. N92-12201
RILEY, THOMAS P. N92-12232
RINEHART, L. F. N92-12167
RINGERTZ, ULF TORBJOERN N92-12312
RIOUX, M. N92-12234
N92-12476
RIPPERDA, M. N92-12330
RIZZO, C. N92-12650
RIZZO, THOMAS G. N92-12648
ROBERGE, HELENE N92-12352
ROBERTS, K. N92-12524
ROBERTSON, ROBERT GRAHAM HAMISH N92-12638
ROBERTUS, R. J. N92-12337
ROBINSON, PAUL AARON N92-12373
ROBINSON, R. A. N92-12642
ROBISCOE, R. T. N92-12169
RODRIGUEZ, O. N92-11982
ROEMER, WOLFGANG N92-12562
ROERDINK, J. B. T. M. N92-12408
N92-12486
ROESLER, FRED L. N92-12840
ROIDT, R. M. N92-12196
ROKEY, MARK N92-12278
ROLLVIK, SVEIN N92-12363
ROMANI, P. N92-12876
ROMIG, A. D., JR. N92-12072
ROSE, E. A. N92-12259
ROSEMA, K. D. N92-12882
N92-12883
ROSENBERG, N. J. N92-12355
ROSSON, RITA M. N92-12371
ROTE, D. M. N92-12280
ROUMELIOTIS, GEORGE N92-12979
ROUSSEL, M. N92-12778
ROUX, F. X. N92-12508
ROVERS, W. M. H. M. N92-12625
ROWCLIFFE, A. F. N92-12722
ROY, C. N92-12289
RUBESIN, M. W. N92-11984
RUBINSTEIN, R. N92-12637
RUDBERG, D. A. N92-12699
RUMITZ, M. N92-12242
RUNCHAL, A. K. N92-12220
RUNDO, J. N92-12410
RUNGE, ERICH KARL RAINER N92-12619
RUOSO, P. N92-12650
RUSSELL, ALAN J. N92-12060
RUSSO, P. A. N92-12639
RUTLEDGE, CHARLES K. N92-11992
RUTTINK, P. J. A. N92-12631
RYAN, H. M. N92-12051
RYDEN, BARBARA S. N92-12965

S

SABNIS, J. S. N92-12273
SADA, KOICHI N92-12345
SALES, B. C. N92-12741
SALGADO, C. N92-12651
SALOMONSON, VINCENT V. N92-12427
SAMPIETRO, M. N92-12187
N92-12188
SAMPSON, W. B. N92-12743
SANDFORD, S. A. N92-12903
N92-12906
SANDSTROEM, BJOERN N92-12400
SANTAVICCA, DOM A. N92-12050
SANTORO, ROBERT J. N92-12051
SARANTITES, D. G. N92-12654
SARKAR, S. N92-12248
SATO, HIROSHI N92-12221
SATTERFIELD, C. N. N92-12091
SAULYS, A. C. N92-12636
SAUNDERS, G. C. N92-12249
SAXENA, A. N92-12605
N92-12764
SAYER, M. N92-12751
SAYER, R. O. N92-12739
SCATTOLINI, R. N92-12551
SCHAEFER, B. A. N92-12543
SCHANWALD, L. P. N92-12163
N92-12702
SCHARRER, G. L. N92-12170
SCHECHTER, D. E. N92-12053
SCHERB, FRANK N92-12840
SCHIEPERS, REINIER CHRISTIAAN JACOBUS
N92-12103
SCHILLING, LARRY N92-12014
SCHIRBER, J. E. N92-12747
SCHIRVANIAN, OLIVIER N92-12490
SCHLEICHER, DAVID G. N92-12841
SCHLOERB, F. PETER N92-12842
N92-12885
SCHMALZ, KAREN N92-12016
SCHMIDT-GERSTMEYER, HARALD N92-12034
SCHMIDT, K. E. N92-12771
SCHMIDT, MAARTEN N92-12966
N92-12967
SCHMITT, M. J. N92-12263
SCHMOR, P. W. N92-12248
SCHNEIBEL, J. H. N92-12112
SCHNEIDER, B. A. N92-12148
SCHNEIDER, S. L. N92-12228
SCHNEPF, UWE N92-12552
SCHNITZELER, F. N92-12719
SCHNITZER, H. J. N92-12604
SCHOEN, NORBERT N92-12093
SCHOEN, P. D. N92-12018
SCHRAM, D. C. N92-12716
N92-12717
N92-12718
N92-12719
N92-12720
N92-12721
SCHRANNER, RUDOLF N92-12421
SCHREYER, HERBERT N92-12421
N92-12422
SCHRIJVER, A. N92-12584
SCHROEDER-BERGEN, ECKART N92-12754
SCHROER, BERNARD J. N92-12448
SCHUBERTH, L. N92-12459
SCHUELER, DIERK N92-12391
SCHUETZE, THOMAS N92-12181
SCHWARTE, A. N92-12462
SCHWARZ, R. B. N92-12117
SCHWEIZER, K. S. N92-12089
SCHWUTTKE, URSULA M. N92-12022
SCOTT, R. F. N92-12059
SCOTTI, J. V. N92-12868
SCRIMGEOUR, J. H. C. N92-12477
SDOGATI, FABIO N92-12787
SEAGER, C. H. N92-12757
SEAH, M. P. N92-12087
SEE, THOMAS N92-12926
SEGALMAN, D. J. N92-12266
SEIBERG, N. N92-12593
SEKA, W. N92-12691
SELA, MORDECHAI N92-12537
SELEGUE, J. P. N92-12073
SELF, ARTHUR G. N92-12526
SEMERTZIDIS, Y. N92-12650
SEMPLE, W. G. N92-12532
SHAEFFER, D. L. N92-12441
SHAHINPOOR, M. N92-12135
N92-12136
SHAKURA, N. I. N92-12963
N92-12964
SHALEV, MICHAL N92-12537
SHAMSUZZAMAN, K. N92-12423
SHANNON, D. W. N92-12337
SHAPIRO, IRWIN I. N92-12843
N92-12882
N92-12883
N92-12886
SHAVER, B. E. N92-11990
SHAW, C. B., JR. N92-12701
SHEFFIELD, R. L. N92-12262
SHEN, WEIMING N92-12094
SHERDEN, D. J. N92-12662
SHI, HENGCHANG N92-12634
SHI, WEIJUNG N92-12183
SHIH, C.-Y. N92-12925
SHOKAIR, I. R. N92-12445
SHORI, R. N92-12685
SHTANOV, YU. V. N92-12943
SHU, CHI-WANG N92-12557
SIDE, R. N92-12543
SIKKA, V. K. N92-12118
SILICH, S. A. N92-12937
SILVA, WALTER A. N92-11977
SILVERA, ISAAC F. N92-12623
SIMEONI, D. N92-12240
SIMINOVITCH, M. N92-12195
SIMMS, D. A. N92-12037
SIMONSON, J. M. N92-12090
SIMONSON, JONATHAN N92-12351
SINGER, CHRISTIAN N92-12681
SINGER, K. D. N92-12683
SINGH, J. P. N92-12756
SIPS, ADRIANUS CORNELIS CATHERINA .. N92-12709
SISK, W. N. N92-12078
SISLIAN, J. P. N92-11996
SIVIA, D. S. N92-12642
SJOEL, HENRIK N92-12363
SKINNER, G. K. N92-12949
SKINNER, JAMES M. N92-12522
SKOEELV, AAGE N92-12157
SLIWA, NANCY N92-12031
SMEDES, TAEDE N92-12176
SMITH, CHARLES D. N92-12598
SMITH, ELIZABETH A. N92-12784
SMITH, GUY A. N92-12231
SMITH, HARLAN J. N92-12844
SMITH, I. D. N92-12190
SMITH, J. L. N92-12120
SMITH, JILL Y. N92-12503
SMITH, M. W. N92-12049
SMITH, MARCIE N92-12021
SMITH, P. D. N92-12133
SMITH, P. R. N92-12004
SNELLING, D. R. N92-12085
SNIDER, R. T. N92-12732
SNOEIJ, P. N92-12378
SNYDER, CHRISTOPHER A. N92-11995
SNYDER, LEWIS E. N92-12845
N92-12887
SNYDER, S. C. N92-12701
SOBEHART, J. R. N92-12635
SOBOTKA, L. G. N92-12653
SOCKI, R. A. N92-12917
N92-12928
SODEN, J. M. N92-12189
SOIFER, B. T. N92-12831
N92-12880
N92-12968
SOKHADZE, Z. A. N92-12940
SOMMEIJER, B. P. N92-12565
N92-12567
N92-12568
SOMMER, W. F. N92-12640
SONDER, E. N92-12741
SONNENFELD, GERALD N92-12389
N92-12390
SOVERS, O. J. N92-12481
SPERGEL, DAVID N. N92-12965
SPIAK, S. H. N92-12661
SPINRAD, HYRON N92-12846
SRINIVASAN, S. N92-12117
SRINIVASSAN, R. N92-11988
SRIVASTAVA, P. C. N92-12411
SRIVASTAVA, Y. N. N92-12603
ST.CLAIR, ANNE K. N92-12121
STACEY, G. J. N92-12242
STADLER, HENRY L. N92-12438
STAGGS, M. C. N92-12674
STALKER, K. T. N92-12602
N92-12685
STANISLAS, M. N92-12216
STEARNS, SAMUEL D. N92-12492
STEELE, W. V. N92-12769
STEVENSON, RYAN N92-11983
STOAKLEY, DIANE M. N92-12121
STOLEN, R. H. N92-12671
STOOF, HENDRICUS THEODORUS CHRISTIAAN
N92-12621
N92-12622
N92-12623
N92-12624
N92-12625
N92-12626
N92-12627
STOREY, C. N92-12491
N92-12577
STORTIGAJANI, G. N92-12511
STRAAIJER, A. N92-12719
STRAKEY, P. A. N92-12051
STRAUSS, MICHAEL A. N92-12969
STREHMEL, K. N92-12565
STRIZAK, J. P. N92-12070
STROM, KAREN M. N92-12847
STROM, STEPHEN E. N92-12847
STRZYZAKOWSKI, ZYGMUNT N92-12277
STURGEON, WAYNE R. N92-11986
SUCK, J. B. N92-12642
SUDBERY, A. N92-12592
SULLIVAN, J. A. N92-12259
SULLIVAN, R. G. N92-12337
SULLIVAN, THOMAS A. N92-12079
SUN, C. T. N92-12063
SUN, JEFFREY JIAFANG N92-12130
SUN, YANG REN N92-12741
SUNYAEV, RASHID A. N92-12933
N92-12949
N92-12970
SUTTON, S. N92-12521
SWAIN, D. W. N92-12736
SWANSON, B. N92-12605
SWANSON, M. S. N92-12951
SWARTZ, MORRIS L. N92-12607
SWARZTRAUBER, P. N. N92-12365

T

TAI, WALLACE N92-12426
TAKEUCHI, TATSU N92-12643
TAKIZAWA, YOSHIHISA N92-12221
TALLANT, D. R. N92-12683
TANARY, S. N92-12289
TANG, I. N. N92-12767
TANKERSLEY, LAWRENCE L. N92-12251
TAUSWORTHE, ROBERT C. N92-12482
TAVANI, M. N92-12975
TAYLOR, A. D. N92-12642
TAYLOR, D. J. N92-12049
TAYLOR, J. H. N92-12971
TEDESCO, EDWARD F. N92-12648
N92-12888
TERRILE, RICHARD J. N92-12849
THEWLIS, D. J. N92-12450
THIEM, K. N92-12166
THOLEN, DAVID J. N92-12850
N92-12851
N92-12866
N92-12889
N92-12890
THOMAS, CHRISTINE N92-12460
THOMAS, KATHIE L. N92-12919
THOMAS, R. K. N92-12281
THOMAS, V. A. N92-12247
THOMPSON, J. R. N92-12741
N92-12758
TIAN, ZHENYE N92-12114
TIELENS, A. G. G. M. N92-12903
TIGGES, C. P. N92-12749
TILMANS, E. N92-12009
TILTON, JAMES C. N92-12425
N92-12431
TIMMERMANS, C. J. N92-12716
N92-12717
TISONE, G. C. N92-12702
TOMLINSON, J. J. N92-12326
TONG, XUEWENG N92-12114
TONN, B. N92-12774
N92-12782
TOPOLSKI, MARK J. N92-12109
TORRANCE, J. B. N92-12744
TOVEDAL, HANS N92-12773
TOWNES, C. H. N92-12242
TRAEGER, R. K. N92-12340
TRAFTON, L. N92-12852
N92-12891
N92-12892
TRAPP, G. N92-12329
TREIMAN, ALLAN H. N92-12929
TRETHEWEY, B. N92-12252
TREUMANN, R. A. N92-12364
N92-12982
TRIVERS, KATHLEEN KEARNEY N92-12933

TROMP, JOHN N92-12186
TROMPERT, R. A. N92-12569
TRUESDELL, A. N92-12330
TSAI, C. C. N92-12053
TSE, D. G-N. N92-12273
TSENG, FAN T. N92-12448
TSENG, WILLIAM Y. N92-12470
TSIKARISHVILI, E. G. N92-12947
TSUJI, K. S. N92-12357
TULINIUS, H. N92-12330
TUMINARO, RAY S. N92-12496
TUMMILLO, A. F. N92-12171
TUNNELL, T. W. N92-12358
TURMAN, B. N. N92-12164
TURNER, R. R. N92-12349
TURPIN, BETTY ANN M. N92-12418

U

UECKER, ARWED R. N92-12184
ULVSAND, THOMAS N92-12773
UNBGER, S. W. N92-12984
USOV, V. V. N92-12972
UTROBIN, V. P. N92-12973

V

VAKKILAINEN, ESA N92-12331
VANDENBERG, B. N92-12477
VANDERGRIFF, K. U. N92-12162
VANDERHOUWEN, P. J. N92-12565
N92-12567
N92-12568
VANDERKLIS, M. N92-12958
VANDYKE, J. W. N92-12368
VANES, J. T. N92-12178
VANEVERY, D. N92-11966
VANGISBERGEN, JOSEPHUS GERARDUS MARIA
N92-12122
VANHALSEMA, D. N92-12378
VANHULSTEYN, D. B. N92-12740
VANKONYNENBURG, R. N92-12666
VANKUIK, GIJSBERTUS ARNOLDUS MARIA
N92-11973
VANLENTHE, J. H. N92-12631
VANMOURIK, B. N92-12374
VANPARADIJS, J. N92-12958
VANSANT, J. H. N92-12666
VANTRIGT, J. H. N92-12178
VARNHORN, WERNER N92-12217
N92-12218
VASSEUR, H. A. N92-12268
VAUGHAN, WILLIAM W. N92-12360
N92-12362
VAUGHN, M. T. N92-12603
VEDEL, FERNANDE N92-12361
VEDEL, MICHEL N92-12361
VENAILLE, CHRISTOPHE N92-12406
VENLENTHE, J. H. N92-12629
VENTURINI, E. L. N92-12749
VERDERBER, R. N92-12195
VERHAAR, B. J. N92-12622
N92-12623
N92-12624
N92-12625
N92-12626
N92-12627
VERMALLE, J. C. N92-12778
VERWER, J. G. N92-12569
VIDDELEER, R. N92-12009
VIEGAS, J. R. N92-11984
VIGIL, A. S. N92-12133
VIJAYAKUMAR, B. V. K. N92-12602
N92-12685
VILAS, FAITH N92-12853
N92-12893
VILLA, J. R. N92-12458
VISSERS, R. N92-12455
VOGELSONG, KRISTOFER H. N92-12033
VOGELZANG, J. N92-12378
VONBOEHM, HANS-DIETER N92-12421
N92-12422
VONRETH, ROLF-D. N92-12590
VU-KHANH, T. N92-12062
N92-12128
N92-12752
VYAS, A. D. N92-12788

W

WACKERBAUER, R. N92-12578
WADDLE, D. B. N92-12328
WAGNER, B. A. N92-12763
WAGNER, J. S. N92-12445
WAGSTAFF, J. N92-12924
WAGSTAFF, R. N92-12543
WAHL, TERJE N92-12157
WALKER, E. N92-12742
WALKER, J. E. N92-12143
WALKER, RAYMOND J. N92-12429
WALLACE, RICHARD W. N92-12149
WALLACE, W. N92-12105
N92-12288
WALSH, DEBRA B. N92-12351
WALTER, C. E. N92-12666
WANG, GUANGSHENG N92-12114
WANG, JINSONG N92-12761
N92-12762
WANG, KEQIN N92-12762
WANG, NANLIN N92-12761
N92-12762
WANG, SHAOMIN N92-12246
WANG, WEI-CHYUNG N92-12367
WANG, YUGUI N92-12761
N92-12762
WANG, YUN N92-12900
WARREN, J. N92-12910
WARREN, R. W. N92-12260
WARTAK, M. S. N92-12711
N92-12712
WAVRIK, R. W. N92-12165
WEBER, G. J. N92-12165
WEBSTER, C. E. N92-12171
WECHSLER, M. S. N92-12640
WEIDENSCHILLING, S. J. N92-12804
WEIGOLD, E. N92-12614
WEINBRECHT, E. A. N92-12164
WEIRICK, L. J. N92-12137
WEISS, R. S. N92-12332
WEITZNER, H. N92-12693
WEN, YANGXI N92-12724
WENDER, I. N92-12138
WENTWORTH, SUSAN J. N92-12930
WENTZ, F. N92-12385
WESTERINK, JOANNE HENRIETTE DESIREE M.
N92-12413
WESTPFAHL, DAVID J. N92-12836
N92-12874
WHELAN, MICHAEL A. N92-12531
WHIPPLE, LARRY K. N92-12017
WHITBECK, J. F. N92-12657
WHITE, R. H. N92-12687
WHITEMAN, W. E. N92-12295
WHITMORE, STEPHEN A. N92-11994
WIDGOFF, M. N92-12660
WIEDEMAN, S. N92-12335
WIESMANN, H. N92-12915
N92-12925
WIKSTROEM, LARS-ERIK N92-12399
WILBERS, ARNOLD THEODOOR MARIE N92-12715
N92-12716
N92-12717
N92-12718
N92-12719
N92-12720
N92-12721
WILBURN, J. W. N92-12441
WILDE, PETER N92-12600
WILDER, M. E. N92-12249
WILHELM, D. N92-12193
WILKINSON, N. N92-12248
WILLIAMS, J. G. N92-12854
N92-12894
WILLIAMS, R. M. N92-12534
WILLIAMSON, D. E. N92-12736
N92-12739
WILLIAMSON, D. L. N92-12365
WILLIS, J. M. N92-12124
N92-12127
WILSON, D. C. N92-12166
WILSON, W. L., JR. N92-12261
WINTER, J. N92-12733
WIRTENSON, G. R. N92-12687
WISNIEWSKI, WIESLAW Z. N92-12855
WITHERSPOON, P. A. N92-12330
WOLF, MICHAEL N92-12616
WOLFE, C. R. N92-12672
N92-12674
WORKMAN, GARY L. N92-12139
N92-12231
N92-12239
N92-12269
WORL, L. A. N92-12605
WOROBEY, W. N92-12111
WRIGHT, K. W. N92-12452
WU, ANGELA Y. N92-12319
WU, JIIN-CHUAN N92-12438
WU, XIAOGUANG N92-12762
WYCKOFF, SUSAN N92-12856

X

XIE, JIKANG N92-12723
XU, DEMING N92-12724

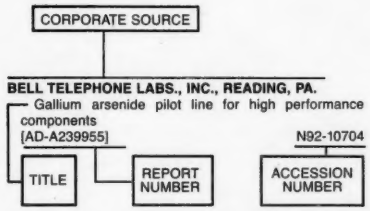
Y

YAMADA, T. N92-12347
YAMAMOTO, MASANOBU N92-12476
YAMBURENKO, N. N92-12949
N92-12970
YANG, L. N92-12335
YANG, REN SUN N92-12758
YANG, SHIZHONG N92-12114
YARLIKOV, S. F. N92-12942
YE, HUANCHUN N92-12612
YEOMANS, DONALD K. N92-12857
N92-12895
YI, G. N92-12751
YOKOTA, JEFFREY W. N92-12212
YOUNG, D. M. N92-12446
YOUNG, G. R. N92-12658
YOUNG, K. D. N92-12038
YOUNG, L. M. N92-12262
YOUSSEF, Y. N92-12289
YSTAD, BJORNAR N92-12675
YU, L. H. N92-12743
YU, YUNCHANG N92-12634
YUE, QINGYU N92-12985
YUGO, J. J. N92-12736
N92-12739
YUST, C. S. N92-12284

Z

ZACHARIA, T. N92-12096
N92-12283
ZAHNLE, K. N92-12931
ZAK, ADAM R. N92-12471
ZALTASH, A. N92-12088
ZAVATTINI, E. N92-12650
ZELENSKII, A. N. N92-12248
ZELLER, R. T. N92-12435
N92-12444
ZHANG, H. N92-12424
ZHANG, HONGYIN N92-12724
ZHANG, SHOU X. N92-12448
ZHAO, ALEX XIAOXIN N92-12202
ZHAO, MIN N92-12489
N92-12490
ZHELEZNYKH, I. M. N92-12945
ZHENG, X. Y. N92-12766
ZHENG, Z. Y. N92-12765
ZHU, G. J. N92-12279
ZHU, SHEN N92-12765
N92-12766
ZHU, SI QUAN N92-12545
ZIPOY, D. N92-12875
ZLOTNICKI, V. N92-12385
ZOEPFEL, STEFAN N92-12253
ZOLENSKY, MICHAEL E. N92-12908
N92-12932
ZUCKERWAR, ALLAN J. N92-12174
ZUTAVERN, F. J. N92-12163
N92-12190
ZUZEK, JOHN E. N92-12151
ZWAAN, M. N92-12408
ZWAANS, R. N92-12631
ZWART, B. N92-12374

Typical Corporate Source Index Listing



Listings in this index are arranged alphabetically by corporate source. The title of the document provides the user with a brief description of the subject matter. The report number helps to indicate the type of document cited (e.g., NASA report, translation, NASA contractor report). The accession number denotes the number by which the citation is identified. The titles are arranged under each corporate source in ascending accession number order.

A

ABASTUMANI ASTROPHYSICAL OBSERVATORY, GEORGIA (USSR).
Manifestations of dynamo driven large-scale magnetic field in accretion disks of compact objects N92-12940
Turbulization of shear flows in astrophysics N92-12941
On two-dimensional relativistic stellar winds N92-12947
Georgian space research program N92-12955
On the nature of pulsar radiation N92-12956

ACADEMY OF SCIENCES OF THE UKRAINIAN SSR, KIEV.
Gas flow and generation of x ray emission in WR+OB binaries N92-12972

ACADEMY OF SCIENCES (USSR), LENINGRAD.
Generation of ultrahigh-energy gamma rays in accreting x ray pulsars N92-12950

ACADEMY OF SCIENCES (USSR), MOSCOW.
High-Energy Astrophysics. American and Soviet Perspectives
[NASA-CR-186558] N92-12933
On the evolution of pulsars N92-12935
The spin down of the radio pulsars: Braking index N92-12936
Regular variability of the shape of the primary minimum of the orbital light curve of SS 433 with the phase of the precessional period N92-12942
Chaotic inflationary universe and the anisotropy of the large-scale structure N92-12943
Radio telescopes as the detectors of super-high-energy neutrinos N92-12945
Observations of x ray pulsars from the Kvant module N92-12949
The evolution of the gravitational radiation from stellar components of galaxies N92-12959
On the observational appearances of a freely precessing neutron star in Hercules X-1 N92-12963
The PSR 2127+12 as an indicator of a massive blac k hole in the core of globular cluster M 15 N92-12964
X ray radiation from Supernova 1987A. The results of the Kvant module in 1987-1989 N92-12970

ACQUIRED INTELLIGENCE, INC., VICTORIA (BRITISH COLUMBIA).
A knowledge-based intelligent tutoring system: ACQUIRE (tm)-ITS N92-12543

ADVISORY GROUP FOR AEROSPACE RESEARCH AND DEVELOPMENT, NEUILLY-SUR-SEINE (FRANCE).
Software for Guidance and Control
[AGARD-CP-503] N92-12449
Machine Intelligence for Aerospace Electronic Systems
[AGARD-CP-499] N92-12517

AERONAUTICAL RESEARCH INST. OF SWEDEN, STOCKHOLM.
Performance improvements and fuel cost savings due to leading edge modification of a vintage delta wing jet fighter
[FFA-TN-1991-22] N92-11993
Optimal design of nonlinear shell structures
[FFA-TN-1991-18] N92-12312
A review of aeronautical fatigue investigations in Sweden during the period May 1989 to April 1991
[FFA-TN-1991-24] N92-12313
Acoustic characteristics of anechoic chamber at FFA
[FFA-TN-1990-43] N92-12599
Fredholm's alternative for impedance boundary value problems in acoustics
[FFA-TN-1990-46] N92-12600
Aeroacoustics in inhomogeneous flow field
[FFA-TN-1991-30] N92-12601

AEROSPACE CORP., SUNNYVALE, CA.
Advanced Satellite Workstation (ASW) N92-12521

AEROSPATIALE, CANNES (FRANCE).
New concept for a highly-compact Imaging Fourier Transform Spectrometer (IFTS)
[REPT-911-440-110] N92-12240
Potential of tuneable lasers for optimised dual-colour laser ranging
[REPT-911-440-111] N92-12255
Toward the optimisation of passive ground targets in spaceborne laser ranging
[REPT-911-440-112] N92-12256
MERIS data compression: A presentation of the current status of the study
[REPT-911-440-113] N92-12322
ISO optical subsystem
[REPT-911-440-115] N92-12681
Solar array management guide
[REPT-911-440-114] N92-12778

AEROSPATIALE, PARIS (FRANCE).
Structures and fracture mechanic of brittle matrix composites
[REPT-911-430-131] N92-12064
Nondestructive testing of oxidation protected carbon/carbon materials
[REPT-911-430-136] N92-12065
Nondestructive testing of sandwich structures
[REPT-911-430-137] N92-12066
Acoustic emission applied to composite material structures
[REPT-911-430-138] N92-12067
Design of an industrial CT system for very large composite structures
[REPT-911-430-133] N92-12145
ACLICO: An aid system for designing bonded joints
[REPT-911-430-134] N92-12146
An analysis of thermosolutal convection during the crystal growth of CdTe from Te solution by the THM
[REPT-911-430-135] N92-12755

AEROSPATIALE, SURESNES (FRANCE).
Design, manufacture, and calibration of Foucault current sensors
[DCR/M-51739/F-90] N92-12235
Identification of complex modules in othotropic materials by means of free vibration analysis
[REPT-911-550-101] N92-12311

AEROSPATIALE AQUITAINE, SAINT-MEDARD EN JALLES (FRANCE).
Study of adhesive elastoplastic glued joints
[REPT-NT-24192/AQEN] N92-12308

AIR FORCE ARMAMENT LAB., EGLIN AFB, FL.
Common Ada Missile Packages (CAMP) N92-12468

AIR FORCE AVIONICS LAB., WRIGHT-PATTERSON AFB, OH.
AFSCN command and control segment evolution N92-12017

ALABAMA UNIV., HUNTSVILLE.
Materials processing in low gravity
[NASA-CR-184213] N92-12139
Modifications to the rapid melt/rapid quench and transparent polymer video furnaces for the KC-135
[NASA-CR-184215] N92-12231
Optical studies in the holographic ground station
[NASA-CR-184257] N92-12239
Welding in Space Workshop
[NASA-CR-184234] N92-12269
The variable polarity plasma arc welding process: Characteristics and performance
[NASA-CR-184259] N92-12279
Chemical release and radiation effects experiment advanced planned
[NASA-CR-184229] N92-12360
Combined Release and Radiation Effects Satellite (CRRES) Experiment: Educational planning and coordination
[NASA-CR-184255] N92-12362
Automatic programming of simulation models
[NASA-CR-184221] N92-12448
The formation, structure and dissipation of direct electric current systems in the solar atmosphere N92-12979

ALLEGHENY OBSERVATORY, PITTSBURGH, PA.
Allegheny Observatory search for planetary systems N92-12812

AMERICAN UNIV., WASHINGTON, DC.
Sensory processing and world modeling for an active ranging device
[NASA-CR-188915] N92-12319

AMES LAB., IA.
Reduced molybdenum oxidation states in hydrodesulfurization catalysis by Chevrel phases
[DE91-018168] N92-12092
Chemically modified polymeric resins for high performance liquid chromatography, solid-phase extraction, and organic separation by LC and GC
[DE91-018166] N92-12130

ANALEX CORP., CLEVELAND, OH.
Microgravity science requirements and the need for data compression N92-12430

ARGONNE NATIONAL LAB., IL.
Molten carbonate fuel cell research
[DE90-013896] N92-12120
Performance evaluation of advanced battery technologies for electric vehicle applications
[DE90-013895] N92-12171
COMMIX-1AR/P: A three-dimensional transient single-phase computer program for thermal hydraulic analysis of single and multicomponent systems
[DE91-018703] N92-12222
Computation of magnetic suspension of maglev systems using dynamic circuit theory
[DE91-017973] N92-12280
Production of desalinated water using ocean thermal energy
[DE91-018894] N92-12336
History of the determination of radium in man since 1915
[DE92-000355] N92-12410
From knots to quantum groups (and back)
[DE90-013688] N92-12591
Consistent multiparameter quantisation of GL(n)
[DE90-013689] N92-12592
Superdeformed nuclei
[DE92-000269] N92-12647
Identifying the origin of new gauge bosons at the SSC and LHC
[DE92-000290] N92-12648
Workshop on High Heat Load X Ray Optics
[DE90-011799] N92-12673
The need for superconducting magnets for MHD seawater propulsion
[DE90-013651] N92-12705
Inductive currents in an RF driven plasma
[DE92-000491] N92-12738
Strengthening of composites by internal stresses: Determination by neutron diffraction
[DE91-018549] N92-12756
Forecast of transportation energy demand through the year 2010
[DE92-000222] N92-12788

ARIZONA STATE UNIV., TEMPE.
Spectroscopy of comets N92-12856

ARIZONA UNIV., TUCSON.
Infrared studies of star formation in the rho Ophiuchi dark cloud N92-12790
Planetary Spectroscopy N92-12811
Surveying of the solar system N92-12813

Interiors and atmospheres of the outer planets N92-12821
Studies of extended planetary atmospheres N92-12822
Cometary spectroscopy and imaging N92-12827
Infrared observations of solar system objects N92-12828
The radial velocity search for extrasolar planets N92-12832
Stellar occultations by planetary rings: 3 July 1989 28 SGR occultation by Saturn N92-12838
Physical studies of small asteroids and cometary nuclei N92-12855
Discovery of near-Earth asteroids by CCD scanning N92-12868
Probing Titan's atmosphere with a stellar occultation N92-12871
Storm on Saturn N92-12877
Visual and near-IR spectrophotometry of asteroids N92-12878
Instabilities in SN1987A and other supernovae N92-12934

ATMOSPHERIC AND ENVIRONMENTAL RESEARCH, INC., CAMBRIDGE, MA.
Simulating climate with two different numerical schemes
[DE90-011777] N92-12367

ATOMIC ENERGY OF CANADA LTD., PINAWA (MANITOBA).
An evaluation of the potential of combination processes involving heat and irradiation for food preservation
[DE91-638734] N92-12423

AUSTRALIAN NATIONAL UNIV., CANBERRA.
A novel scanning interferometer for two-dimensional plasma density measurements
[DE90-625514] N92-12697
Papers presented at Seventh International Workshop on Stellarators
[DE90-625560] N92-12698

B

BELEIDSCOMMISSIE REMOTE SENSING, DELFT (NETHERLANDS).
VIERS-1, part 2: Completion of the laboratory experiments
[BCRS-90-27] N92-12378

BHABHA ATOMIC RESEARCH CENTRE, BOMBAY (INDIA).
Current programmes of Metallurgy Division, 1991
[DE91-634904] N92-12104

BIRMINGHAM UNIV. (ENGLAND).
Observations of x ray pulsars from the Kvant module N92-12949
X ray radiation from Supernova 1987A. The results of the Kvant module in 1987-1989 N92-12970

BRANDEIS UNIV., WALTHAM, MA.
Research in elementary particle physics
[DE90-013443] N92-12604

BRITISH AEROSPACE DYNAMICS GROUP, STEVENAGE (ENGLAND).
The data oriented requirements implementation scheme N92-12460

BRITISH AEROSPACE PUBLIC LTD. CO., PRESTON (ENGLAND).
TACAID: A knowledge based system for tactical decision making N92-12524
Development of tactical decision aids N92-12532

BROOKHAVEN NATIONAL LAB., UPTON, NY.
Heat transfer between stratified liquids with bubbling across the interface
[DE90-008579] N92-12192
Transformation and deposition of atmospheric nitrogen species: A view from the aqueous side
[DE90-013737] N92-12348
Concluding remarks: Promises and limitations of individual cell and particle analysis
[DE91-016900] N92-12381
When is a dose not a dose?
[DE92-000132] N92-12409
A computer program for the 2-D magnetostatic problem based on integral equations for the field of the conductors and boundary elements
[DE92-000130] N92-12596
An experiment to observe strange particle production in ion collisions at the AGS
[DE92-000135] N92-12636
A search for the coherent production of axions in the milli eV range
[DE92-000439] N92-12650
The performance of a superconducting micro-undulator prototype
[DE90-012639] N92-12743
Simultaneous determination of optical and thermodynamic properties of an evaporating aqueous solution droplet
[DE90-010652] N92-12767

BROWN UNIV., PROVIDENCE, RI.
A special function coprocessor for level-2
[DE90-013327] N92-12435
D0 data acquisition: High speed data paths for D0
[DE90-013326] N92-12444
A research program in experimental high energy physics
[DE90-013321] N92-12659
Research program in experimental high energy physics, task B
[DE90-013323] N92-12660

C

CALIFORNIA INST. OF TECH., PASADENA.
Near infrared imaging of the outer planets N92-12880
Neutron starquake model for gamma-ray bursts N92-12938
A statistical analysis of gamma-ray bursts detected by the Konus Experiment on Venera 11 and 12 N92-12966
Extragalactic x ray source counts N92-12967
Ultraluminous infrared galaxies N92-12968

CALIFORNIA UNIV., BERKELEY.
Spatially resolved quantitative spectroscopy of comets N92-12846
Optical observations of active galactic nuclei N92-12946
Cosmic gamma-ray bursts N92-12954
The peculiar velocity field predicted from the distribution of IRAS galaxies N92-12969
Radiation-driven evolution of low-mass x ray binaries and the formation of millisecond pulsars
[DE92-000123] N92-12975

CALIFORNIA UNIV., BERKELEY. LAWRENCE BERKELEY LAB.
Nitrogen dioxide fluorescence following photolysis in a supersonic jet
[DE90-014164] N92-12078
Maintaining optimum light output with a thermally conductive heat pipe
[DE90-012423] N92-12195
A database for the Geysers geothermal field
[DE90-013811] N92-12330
Air movement, comfort and ventilation in workstations
[DE92-000667] N92-12424
Reverse engineering tools for software: A small study
[DE92-000650] N92-12495
Quantum Monte Carlo for atoms and molecules
[DE90-013793] N92-12608
Ion stability in bunched electron beams
[DE90-014087] N92-12611
An update on passive correctors for the SSC dipole magnets
[DE92-000649] N92-12669
Magnetic field in the SSC arc quad
[DE92-000656] N92-12670
Pressure dependence of the specific heat of heavy-fermion YbCu4.5
[DE90-011584] N92-12742
Specific heat of La(2-x)Sr(x)CuO4; volume fraction of superconductivity; possible structural transition at 45 K
[DE90-011585] N92-12744
The role of inhibitors during electrodeposition of thin metallic films
[DE90-014177] N92-12750
Data management in heterogeneous environments and its implications to CEDR
[DE92-000651] N92-12785

CALIFORNIA UNIV., DAVIS.
Numerical solution of incompressible Navier-Stokes equations using a velocity-vorticity formulation N92-12205
Measurements of laser wavelength scaling ion acoustic decay instability and associated effects in laser-plasma interaction experiments
[DE90-011434] N92-12691
Laser studies of the photodissociation dynamics of cometary radicals N92-12823
Laboratory simulation of the surface of Halley's Comet N92-12872

CALIFORNIA UNIV., LOS ANGELES.
Scientific requirements for space science data systems N92-12429
The TITAN reversed-field-pinch fusion reactor study, volume 3
[DE92-000139] N92-12727
A three-dimensional model for molecular cloud collapse and protostellar formation N92-12898

CALIFORNIA UNIV., SAN DIEGO.
A differential charging model for synchronous satellites N92-12041
Refractive interstellar scintillation effects in pulsar observations N92-12791
Nucleosynthetic gamma ray lines and positrons from supernovae N92-12983

CANADIAN SPACE AGENCY, OTTAWA (ONTARIO).
Spacecraft electrical power system fault detection/diagnosis and resource management N92-12523

CARNEGIE-MELLON UNIV., PITTSBURGH, PA.
Heuristic methods for optimal trajectory planning of robotic manipulators N92-12272
A unified motion planning approach for redundant and non-redundant manipulators with actuator constraints
[NASA-CR-189002] N92-12274
A unified motion planning approach for redundant and non-redundant manipulators with actuator constraints
[NASA-CR-189023] N92-12276
Prospects in extended inflation N92-12900

CENTER FOR MATHEMATICS AND COMPUTER SCIENCE, AMSTERDAM (NETHERLANDS).
The energy complexity of threshold and other functions (preliminary version)
[CWI-CS-R9101] N92-12186
Cardiac magnetic resonance imaging by retrospective gating: Mathematical modelling and reconstruction algorithms
[CWI-AM-R9024] N92-12408
Morphological discretization
[CWI-BS-R9105] N92-12479
The syntax and semantics of micro CRL
[CWI-CS-R9076] N92-12480
Embedding as a tool for language comparison
[CWI-CS-R9102] N92-12483
Program calculation properties of continuous algebras
[CWI-CS-R9104] N92-12484
Modular properties of conditional term rewriting systems
[CWI-CS-R9105] N92-12485
On the construction of translation and rotation invariant morphological operators
[CWI-AM-R9025] N92-12486
Three dimensional shallow water model on the Cray Y-MP4/464
[CWI-NM-R9106] N92-12487
Process algebra with signals and conditions
[CWI-CS-R9103] N92-12510
Analysis and optimization of polling systems
[CWI-BS-R9102] N92-12548
Descriptor representations without direct feedthrough term
[CWI-BS-R9103] N92-12563
Central limit theorem for non-homogeneous processes with independent increments and semimarkov switchings
[CWI-AM-R9026] N92-12564
Smoothed Runge-Kutta methods in the method of lines
[CWI-NM-R9101] N92-12565
A two-grid analysis of the combination of mixed finite elements and Vanka-type relaxation
[CWI-NM-R9102] N92-12566
Parallel diagonally implicit Runge-Kutta-Nystroem methods
[CWI-NM-R9103] N92-12567
Parallel solution of the Burgers equation
[CWI-NM-R9104] N92-12568
Local uniform grid refinement for time-dependent partial differential equations
[CWI-NM-R9105] N92-12569
Efficient multi-dimensional upwinding for the steady Euler equations
[CWI-NM-R9107] N92-12570
A local limit theorem for L-statistics
[CWI-BS-R9033] N92-12582
Two nonparametric estimators of the survival function of bivariate right censored observations
[CWI-BS-R9035] N92-12583
Tait's flyping conjecture for well-connected links
[CWI-BS-R9037] N92-12584

CENTRAL RESEARCH INST. OF ELECTRIC POWER INDUSTRY, TOKYO (JAPAN).
Strength evaluation for modified 12Cr steel and A286 steel of USC turbine rotor materials
[DE90-503033] N92-12099
Development of advanced flow simulation system by water flow model
[DE90-503438] N92-12197
Development of atmospheric diffusion evaluation method incorporating thermal and topographical effects. Part 2: A literature review of turbulence model under topographical condition
[DE90-503795] N92-12345
Objective method for assessing monitoring networks
[DE90-505577] N92-12346

CENTRE D'ESSAIS EN VOL, BRETIGNY-SUR-ORGE (FRANCE).
Evaluation of the Aerazur multifunctional flight suit in centrifugal tests
[REPT-38/CEV/SE/LAMAS] N92-12419
Evaluation of the physiological effects of an additional dead space involved in wearing an anti-smoke mask
[REPT-9/CEV/SE/LAMAS] N92-12420
CENTRE D'ETUDE SPATIALE DES RAYONNEMENTS, TOULOUSE (FRANCE).
Cosmic gamma-ray bursts N92-12954
CENTRE D'ETUDES AERODYNAMIQUES ET THERMIQUES, POITIERS (FRANCE).
Control aspects of the transition from transversal to transonic flow, step effects
[ETN-91-90106] N92-11981
Study of a technique of low level turbulence detection
[ETN-91-90107] N92-12215
CENTRE D'ETUDES ET DE RECHERCHES, TOULOUSE (FRANCE).
Study of hypersonic flow turbulence models
[CERT-RF-36/5005-32] N92-11971
Boundary layer transition
[CERT-RTS-55/5018-45] N92-12210
Turbulence control by intake
[CERT-RF-67/5004-37] N92-12211
CENTRE D'ETUDES ET DE RECHERCHES DE MEDECINE AEROSPATIALE, PARIS (FRANCE).
Use of a standardized test battery for the evaluation of psychomotor performances
[CERMA-90-44(LCBA)] N92-12414
CENTRO BRASILEIRO DE PESQUISAS FISICAS, RIO DE JANEIRO.
A simple model for localized-itinerant magnetic systems: Crystal field effects
[DE90-625399] N92-12746
CHINA NUCLEAR INFORMATION CENTRE, BEIJING.
Quick separation and determination of Pm-147 in water by HDEHP-KeL-F chromatography
[DE91-628873] N92-12094
The effect of working process on hydrogenate orientation of Zr-4 alloy tube
[DE91-629474] N92-12114
A scintillation detector for measuring inert gas beta rays
[DE91-630700] N92-12634
Studies of fine structure of discharge region on HT-6B tokamak device
[DE91-628421] N92-12723
Plasma electron density measurement with multichannel microwave interferometer on the HL-1 tokamak device
[DE91-628422] N92-12724
HL-1 tokamak data acquisition system and its initial application in the physical experiment
[DE91-630701] N92-12725
The flux jumps in high Tc Bi(1.7)Pb(0.3)Sr2 Ca2Cu3O(y) bulk superconductor
[DE91-628641] N92-12760
Forming process of 110 K high-Tc phase in Bi-Pb-Sr-Ca-Cu-O system
[DE91-628642] N92-12761
Effect of cooling rate on the transition temperature in Bi-Pb-Sr-Ca-Cu-O system
[DE91-628643] N92-12762
The estimation of the dose from cosmic radiation received by the population living at mainland of China
[DE91-631668] N92-12985
CITY UNIV. OF NEW YORK, NY.
Periodically structured multiphase flows and hydrodynamic instabilities in narrow capillaries
[DE91-018802] N92-12223
COLLABORATIVE TECHNOLOGY CORP., AUSTIN, TX.
Group decision support systems N92-12502
COLORADO SCHOOL OF MINES, GOLDEN.
Three-dimensional explicit depth migration via McClellan transformations on hexagonal sampling grids
[DE91-017370] N92-12558
COLORADO STATE UNIV., FORT COLLINS.
Cloud parameterization for climate models
[DE90-014344] N92-12369
Numerical studies of the role of clouds in the present climate
[DE90-014345] N92-12370
Summary of 1991 Atlantic tropical cyclone activity and seasonal forecast verification: A year of no hurricanes in the tropics but an unusually large number of higher latitude baroclinically influenced tropical cyclone systems N92-12376
Extended range forecast of Atlantic seasonal hurricane activity for 1992 N92-12377
COLORADO UNIV., BOULDER.
Precise relative sea surface positioning of a floating platform using the Global Positioning System (GPS) N92-11987
Lessons learned in control center technologies and non-technologies N92-12026
Wave propagation and scattering in layered media: Application to ultrasonic nondestructive evaluation of interfacial cracks and earthquake ground motion N92-12285
Constraint treatment techniques and parallel algorithms for multibody dynamic analysis N92-12297
Ultrasonic applications for space-based life support systems N92-12415
Theoretical nuclear physics
[DE92-000022] N92-12615
Evolution on large-scale plasma structures in comets: Kinematics and physics N92-12801
The last disconnection events in Comet Halley in April 1986 N92-12862
Photoionization of intergalactic gas and cooling flows in clusters of galaxies N92-12896
Absolute velocity measurements in the solar transition region and corona from observations of ultraviolet emission line profiles N92-12977
Influence of wave-particle interactions on solar flare dynamics N92-12978
COLUMBIA UNIV., NEW YORK, NY.
On the origin of the diffuse x ray background N92-12952
COMISION NACIONAL DE ENERGIA ATOMICA, BUENOS AIRES (ARGENTINA).
Corrosion under stress of AISI 304 steel in thiocyanate solutions
[DE91-631523] N92-12115
Failure analysis of turbine blades
[DE91-631513] N92-12282
Cooling of ions trapped in potential wells produced by electromagnetic radiation fields
[DE91-631104] N92-12635
COMPUTER SCIENCES CORP., BELTSVILLE, MD.
Microwave remote sensing and radar polarization signatures of natural fields
[NASA-CR-189249] N92-12317
COMPUTER SCIENCES CORP., HOUSTON, TX.
Using NetMaster to manage IBM networks N92-12500
COMPUTER SCIENCES CORP., LOMPOC, CA.
B-2 and other current flight test control center system architectures N92-12011
CONSULTEC SCIENTIFIC, INC., KNOXVILLE, TN.
Laser spectroscopy: Assessment of research needs for laser technologies applied to advanced spectroscopic methods
[DE90-011788] N92-12244
CORNELL UNIV., ITHACA, NY.
Flow visualization and flow field measurements of a 1/12 scale tilt rotor aircraft in hover
[NASA-CR-189456] N92-11983
Arecibo S-band radar program N92-12803
COUNCIL FOR NATIONAL ACADEMIC AWARDS (ENGLAND).
Variable impedance journal bearings for rotor-bearing systems N92-12270

D

DASSAULT (E. M.) CO., SAINT CLOUD (FRANCE).
A practical experience of Ada for developing embedded software N92-12465
DAYTON UNIV., OH.
Locally linear neural networks for aerospace navigation systems N92-12530
DEFENCE AND CIVIL INST. OF ENVIRONMENTAL MEDICINE, DOWNSVIEW (ONTARIO).
Ejection systems and the human factor: A guide for flight surgeons and aeromedical trainers
[DCIEM-88-TR-16] N92-11986
DEFENCE RESEARCH ESTABLISHMENT, OTTAWA (ONTARIO).
An improved model-creation program for EM interaction analysis
[NRC-31764] N92-12153
DEFENCE RESEARCH ESTABLISHMENT PACIFIC, VICTORIA (BRITISH COLUMBIA).
A damage tolerance assessment of bonded repairs to CF-18 composite components. Part 1: Adhesive properties
[DREP-TM-88-25-PT-1] N92-12060
DENVER UNIV., CO.
Computer conferencing: Choices and strategies N92-12503
DEPARTMENT OF ENERGY, WASHINGTON, DC.
Basic energy sciences: Summary of accomplishments
[DE90-011269] N92-12327
Division of Energy Biosciences: Summaries of FY 1991 activities
[DE92-000518] N92-12401
DEPARTMENT OF THE NAVY, WASHINGTON, DC.
Position and velocity measuring system
[AD-D014975] N92-12232
Method and apparatus for producing a photopumped VUV laser in Mo(6+) ion-containing plasma
[AD-D014961] N92-12250
Narrow-bandwidth diffraction-limited coupled stable-unstable resonator laser cavity
[AD-D014974] N92-12251
Infrared image detector utilizing Schottky barrier junctions
[AD-D014976] N92-12677
DEUTSCHE FORSCHUNGSANSTALT FUER LUFT- UND RAUMFAHRT, GOETTINGEN (GERMANY, F.R.).
Procedure for determination of three-dimensional wind tunnel wall interferences and wall adaptation in compressible subsonic flow using measured wall pressures
[DLR-FB-91-09] N92-12005
DIGITAL EQUIPMENT CORP., HOUSTON, TX.
Networking standards N92-12499
DIGITAL SIGNAL PROCESSING AND CONTROL ENGINEERING G.M.B.H., PADERBORN (GERMANY, F.R.).
Code generation for fast DSP-based real-time control N92-12462
DORNIER LUFTFAHRT G.M.B.H., FRIEDRICHSHAFEN (GERMANY, F.R.).
Software design considerations for an airborne command and control workstation N92-12455
DRAPER (CHARLES STARK) LAB., INC., CAMBRIDGE, MA.
Air-breathing hypersonic vehicle guidance and control studies; An integrated trajectory/control analysis methodology: Phase 1
[NASA-CR-187623] N92-12002

E

EASTMAN KODAK CO., ROCHESTER, NY.
Fast Optically Sensitive Segmented Array (FOSSA)
[DE91-018997] N92-12684
ECOLE NATIONALE SUPERIEURE DE MECANIQUE ET D'AEROTECHNIQUE, POITIERS (FRANCE).
Nonstationary flight aerodynamics in a turbulent environment
[ETN-91-90102] N92-11980
ECOLE NATIONALE SUPERIEURE DE TECHNIQUES AVANCEES, PARIS (FRANCE).
Theoretical and experimental analysis of the fine mechanical behavior of a glued assembly with double slanting layers
[ETN-91-90277] N92-12068
Detailed behavior of a glued double layer assembly in terms of the shearing-off of joint covers N92-12069
ECOLE NATIONALE SUPERIEURE DES TELECOMMUNICATIONS, PARIS (FRANCE).
Study of advanced techniques in modulation and coding for digital beam frequencies with large spectral effectiveness
[TELECOM-PARIS-90-E-020] N92-12152
Mathematical morphology and active contour model: A cooperative approach of lung contours in CT
[TELECOM-PARIS-91-C-004] N92-12405
Three dimensional reconstruction of vascular networks in trinocular vision
[TELECOM-PARIS-90-E-022] N92-12406
Joint carrier phase estimation and symbols decoding of trellis codes
[TELECOM-PARIS-91-C-003] N92-12473
Displacement ranks and fast algorithms
[TELECOM-PARIS-91-E-001] N92-12474
Algorithms and VLSI architecture designs for image transformation in real time
[TELECOM-PARIS-90-E-021] N92-12489
Recognition of three dimensional shapes: Application to chemical molecules
[TELECOM-PARIS-90-E-018] N92-12613
EDGERTON, GERMESHAUSEN AND GRIER, INC., IDAHO FALLS, ID.
An independent review of the Multi-Path Redundant Avionics Suite (MPRAS) architecture assessment and characterization report
[NASA-CR-188126] N92-12440
Multimegawatt space power reactors
[DE90-012965] N92-12657
Phenomenology, diagnostics, and non-LTE effects in plasma-particle interactions
[DE90-013088] N92-12701
EDINBURGH UNIV. (SCOTLAND).
Information and information processing N92-12779
EG AND G ENERGY MEASUREMENTS, INC., LOS ALAMOS, NM.
Workshop on Artificially Ionized Layers in the Atmosphere
[DE90-013470] N92-12358

EG AND G ROCKY FLATS, INC., GOLDEN, CO.
The EDM surface: Topography, chemistry, and metallurgy
[DE91-017756] N92-12110
ELECTRONIC SYSTEM G.M.B.H., MUNICH (GERMANY, F.R.).
Process/object-oriented Ada software design for an experimental helicopter N92-12461
ENVIRONMENTAL HEALTH RESEARCH AND TESTING, INC., RESEARCH TRIANGLE PARK, NC.
Monitoring IACP samples and construction of a centralized database
[PB91-213546] N92-12351
ERG SYSTEMS, INC., SAINT JAMES, NY.
Full surface testing of grazing incidence mirrors
[AD-A240356] N92-12676
ESDU INTERNATIONAL LTD., LONDON (ENGLAND).
Pitching moment derivative due to rate of pitch for projectiles at supersonic speeds
[ESDU-91004] N92-11967
Lift-curve slope of wing-body combinations
[ESDU-91007] N92-11968
Effect of twin fins on isolated tailplane lift-curve slope
[ESDU-91009] N92-11969
Maximum lift of wings with trailing-edge flaps at low speeds
[ESDU-91014] N92-11970
Thermal conductivity of gaseous halogenated hydrocarbons
[ESDU-91005] N92-12080
Vapour pressures and critical points of liquids. Halogenated ethylenes
[ESDU-91006] N92-12081
Thermophysical properties of nitrous oxide
[ESDU-91022] N92-12082
Fatigue crack propagation rates of experimental aluminum lithium sheet and plate alloys
[ESDU-91015] N92-12102
Boiling inside tubes: Saturated wet-wall heat transfer with mixtures
[ESDU-91011] N92-12208
Methods for improving damping. Part 1: An introduction and guide to practical methods of increasing structural damping
[ESDU-91012-PT-1] N92-12301
EUROPEAN ORGANIZATION FOR NUCLEAR RESEARCH, GENEVA (SWITZERLAND).
Large Hadron Collider Workshop. Volume 2: Proceedings
[DE91-634595] N92-12663
EUROPEAN SPACE AGENCY, PARIS (FRANCE).
ECS: Seventh year in orbit
[ESA-BR-74] N92-12009

F

FAIRCHILD SPACE CO., GERMANTOWN, MD.
Centaur in-tank explosion flow fields within STS and Titan 4 payload spaces
[NASA-CR-189039] N92-12144
FFDERAL MINISTRY FOR DEFENCE, BONN (GERMANY, F.R.).
Tool supported software development experiences from the EFA project N92-12451
FERMI NATIONAL ACCELERATOR LAB., BATAVIA, IL.
A fast online event display for a high intensity fixed-target spectrometer
[DE90-012047] N92-12443
Measurement of rho, the ratio of the real to imaginary part of the (-p)p forward elastic scattering amplitude, at (radical)s = 1.8 TeV
[DE92-000155] N92-12637
Jet rates from deep inelastic muon scattering in the W range of 15 to 35 GeV
[DE92-000470] N92-12651
Tracking and vertex finding with drift chambers and neural networks
[DE92-000472] N92-12652
Search for new particles in CDF
[DE92-000638] N92-12655
FLINDERS UNIV., BEDFORD PARK (AUSTRALIA).
Recent (e,2e) studies: Laser excited atoms, autoionization, Auger processes, and thin films
[DE91-634156] N92-12614
FLORIDA STATE UNIV., TALLAHASSEE.
Estimation of surface heat and moisture fluxes over a prairie grassland using a hybrid biosphere/remote sensing model N92-12320
FLORIDA UNIV., GAINESVILLE.
Fluid oscillations and enhanced heat transfer in a parallel plate channel bounded by end reservoirs maintained at different temperature N92-12202
A general nonlinear theory of large elastic deformation of layered plates N92-12296
Consistency conditions and representations of a q-deformed Virasoro algebra
[DE90-013715] N92-12359
FORSCHUNGSINSTITUT FUER FUNK UND MATHEMATIK, WACHTBERG (GERMANY, F.R.).
Network programming: A design method and programming strategy for large software systems N92-12459

G

GEC AVIONICS LTD., ROCHESTER (ENGLAND).
Formal verification of a redundancy management algorithm N92-12457
GEC-MARCONI LTD., STANMORE (ENGLAND).
A survey of available tools and methods for software requirements capture and design N92-12450
GENERAL ATOMIC CO., SAN DIEGO, CA.
The TITAN reversed-field-pinch fusion reactor study, volume 3
[DE92-000139] N92-12727
The multipulse Thomson scattering diagnostic on the D3-D tokamak
[DE92-000262] N92-12732
A system to deposit boron films (boronization) in the D3-D tokamak
[DE92-000288] N92-12733
GEOLOGICAL SURVEY, DENVER, CO.
Geologic mapping of tunnels using photogrammetry-control-point configuration
[DE91-019071] N92-12323
GEORGE WASHINGTON UNIV., WASHINGTON, DC.
Practical input optimization for aircraft parameter estimation experiments N92-11989
GUPTA TECHNOLOGIES, INC., CALLAS, TX.
Cooperative processing data bases N92-12505

H

HARVARD-SMITHSONIAN CENTER FOR ASTROPHYSICS, CAMBRIDGE, MA.
Neutron starquake model for gamma-ray bursts N92-12938
Can a man-made universe be achieved by quantum tunneling without an initial singularity? N92-12951
Observing SN 1987A with the International Ultraviolet Explorer N92-12957
The formation and evolution of domain walls N92-12965
HARVARD UNIV., CAMBRIDGE, MA.
Trapping of neutral atoms with resonant microwave radiation N92-12623
HAWAII UNIV., HONOLULU.
Infrared spectral studies of asteroids N92-12796
Operation of the University of Hawaii 2.2M telescope on Mauna Kea N92-12814
Observational evidence of aging processes in comets N92-12833
Studies of Triton and the Pluto-Charon system N92-12850
Visible and infrared investigations of planet-crossing asteroids and outer solar system objects N92-12851
Outburst of Comet Halley at 14.3 AU N92-12881
The year 1990 marks end of Pluto-Charon mutual event season N92-12889
First spacecraft encounter with an asteroid approaches N92-12890
HOUSTON UNIV., TX.
Information logistics: A production-line approach to information services N92-12506
The business case for connectivity N92-12507

I

IIT RESEARCH INST., BARTLESVILLE, OK.
The thermodynamic properties of benzothiazole and benzoxazole
[DE91-002250] N92-12769
ILLINOIS UNIV., URBANA.
Radar interferometric studies of comets N92-12845
Observations of formaldehyde and search for cyanoacetylene in Comet Brorsen-Metcalf (1988o) N92-12887
IMPERIAL COLL. OF SCIENCE AND TECHNOLOGY, LONDON (ENGLAND).
Reciprocity theory of many-body interactions
[IC-AERO-90-01] N92-12620
INSTITUT DE MECANIQUE DES FLUIDES DE LILLE (FRANCE).
Phenomenological modeling of the wake produced by a straight two dimensional base in subsonic flow
[REPT-90/59] N92-11982
Study of interactions on anemoclinometric sensors
[REPT-90/30] N92-12006
Study of detached turbulent flow in an air intake by means of high speed tomography and laser velocimetry
[REPT-90/55] N92-12216
INSTITUTE FOR ADVANCED STUDY, PRINCETON, NJ.
Lectures on RCFT (Rational Conformal Field Theory)
[DE90-013731] N92-12593
INSTITUTE FOR COMPUTER APPLICATIONS IN SCIENCE AND ENGINEERING, HAMPTON, VA.
The stability of numerical boundary treatments for compact high-order finite-difference schemes
[NASA-CR-187628] N92-12556
Energy models for one-carrier transport in semiconductor devices
[NASA-CR-189046] N92-12557
INSTITUTE FOR PERCEPTION RESEARCH, EINDHOVEN (NETHERLANDS).
Perceived sharpness in static and moving images
[ETN-91-90138] N92-12413
INSTITUTE FOR THEORETICAL AND EXPERIMENTAL PHYSICS, MOSCOW (USSR).
The shock breakout in SN1987A modelled with the time-dependent radiative transfer N92-12939
Hydrodynamic study of Supernova 1987A: The phase of a wave of cooling and recombination N92-12973
INSTITUTE OF SPACE RESEARCH, MOSCOW (USSR).
Axially symmetrical supernova remnants N92-12937
INTELLIGENT ELECTRONICS, TEL AVIV (ISRAEL).
Using AITEST to troubleshoot a Radar Modulator (RM) unit: A case study in the application of expert systems to intermediate-level testing N92-12537
INTERAGENCY NUCLEAR SAFETY REVIEW PANEL.
Uncertainty analysis report for Ulysses, volume 1
[DE91-013476] N92-12039
Safety Evaluation Report for Ulysses, volume 2
[DE91-013475] N92-12040
Safety Evaluation Report for Ulysses, volume 1
[DE91-013473] N92-12047
INTERNATIONAL CENTRE FOR THEORETICAL PHYSICS, TRIESTE (ITALY).
The characters of slab lasers
[DE90-625397] N92-12246

J

JET PROPULSION LAB., CALIFORNIA INST. OF TECH., PASADENA.
JPL's Space Flight Operations Center: Development project overview N92-12012
SHARP: Spacecraft Health Automated Reasoning Prototype N92-12020
Automation for deep space vehicle monitoring N92-12022
Environmental projects. Volume 13: Underground storage tanks, removal and replacement. Goldstone Deep Space Communications Complex
[NASA-CR-189030] N92-12035
Planning and reasoning in the JPL telerobot testbed
[NASA-CR-189038] N92-12278
Vibroacoustic Payload Environment Prediction System (VAPEPS): VAPEPS management center remote access guide
[NASA-CR-189448] N92-12292
Results of the 1991 NASA/JPL balloon flight solar cell calibration program
[NASA-CR-188968] N92-12332
A Pacific Ocean general circulation model for satellite data assimilation
[NASA-CR-189447] N92-12384
An atlas of monthly mean distributions of GEOSAT sea surface height, SSMI surface wind speed, AVHRR/2 sea surface temperature, and ECMWF surface wind components during 1988
[NASA-CR-189029] N92-12385
Catalysis and biocatalysis program
[NASA-CR-189452] N92-12392
Data compression: The end-to-end information systems perspective for NASA space science missions N92-12426
SAR data compression: Application, requirements, and designs N92-12428
Data compression for near Earth and deep space to Earth transmission N92-12432
Integrated, non-volatile, high-speed analog random access memory
[NASA-CASE-NPO-17998-1-CU] N92-12438
Observation model and parameter partials for the JPL VLBI parameter estimation software MODEST/1991
[NASA-CR-189035] N92-12481
A general software reliability process simulation technique
[NASA-CR-189037] N92-12482
Diagnostic reasoning techniques for selective monitoring
[NASA-CR-189446] N92-12549

Contents of the JPL Distributed Active Archive Center (DAAC) archive, version 2-91
[NASA-CR-189027] N92-12784
Infrared observations of small solar system bodies N92-12802
Infrared observations of comets N92-12815
Asteroid photometry N92-12817
Palomar Planet-Crossing Asteroid Survey (PCAS) N92-12819
Goldstone solar system radar N92-12824
Research in planetary Astronomy N92-12831
Physical processes in comets N92-12835
Radar investigation of asteroids and planetary satellites N92-12837
Visual and infrared studies of asteroids and the Pluto-Charon system N92-12848
Planetary optical and infrared imaging N92-12849
Astrometric observations of comets and minor planets N92-12854
Comet and asteroid dynamics N92-12857
Palomar Planet-Crossing Asteroid Survey (PCAS) January 1990 - February 1991 N92-12869
Goldstone solar system radar N92-12873
Asteroid 1986 DA: Radar evidence for a metallic composition N92-12882
Io's radar properties N92-12883
Asteroid absolute magnitudes and slope parameters N92-12888
Astrometric observations of comets and minor planets N92-12894
Minor planet 1566 Icarus: Asteroid or comet? N92-12895

JOHNS HOPKINS UNIV., COLUMBIA, MD.
The 27th JANNAF Combustion Subcommittee Meeting, Volume 1
[CPIA-PUBL-557-VOL-1] N92-12048

K

KANSAS STATE UNIV., MANHATTAN.
Rangeland-plant response to elevated CO2
[DE90-013702] N92-12387

KAUPPA-JA TEOLLISUUSMINISTERIO, HELSINKI (FINLAND).
Electricity from waste heat
[DE91-527080] N92-12331

KENTUCKY UNIV., LEXINGTON.
Metallacumulenes and carbide complexes
[DE90-011324] N92-12073

L

LABORATOIRE D'AEROTHERMIQUE DU CNRS, MEUDON (FRANCE).
Compression ramp in rarefied gas
[RC-90-08] N92-11978
Flat planes in rarefied hypersonic flows
[SESSIA-430/91-940] N92-11979

LABORATOIRE D'AUTOMATIQUE ET D'ANALYSE DES SYSTEMES, TOULOUSE (FRANCE).
V.DMOS transistor modeling for simulation of power electronic circuits
[LAAS-91711] N92-12179
Pyroelectric detectors processed on polyvinylidene fluoride and on copolymer, integrated on silicon substrate: Technological approach of infrared unit sensors and matrix arrays
[LAAS-91134] N92-12236
Study and development of a pressure and acceleration sensor using a piezoelectric polymer (PVDF)
[LAAS-91154] N92-12237
Design and development of proprioceptive sensors to be used for mobile robot localization
[LAAS-91178] N92-12238
Design and study of photon-assisted heteroepitaxial growth system
[LAAS-91187] N92-12753

LABORATOIRES D'ELECTRONIQUE ET DE PHYSIQUE APPLIQUEE, LIMEIL-BREVANNES (FRANCE).
Real-time VLSI architecture for geometric image transformations N92-12490

LANGUAGE SERVICES, KNOXVILLE, TN.
Determination of diffusion coefficients in liquids using the diaphragm cell method
[DE91-018403] N92-12093

LAVAL UNIV. (QUEBEC).
Inspection of materials and structures by infrared thermography: Signal processing techniques for defect enhancement and characterization
[NRC-29717] N92-12291

LAWRENCE LIVERMORE NATIONAL LAB., CA.
Hierarchical controlled component synthesis of large space structures
[DE90-013476] N92-12038
Million-atom plane-strain indentation studies via nonequilibrium molecular dynamics
[DE90-012075] N92-12095
Electroless vs electrodeposited Ni-P alloys for diamond turning applications
[DE91-018999] N92-12113
Ductile-brittle transition temperature testing of tungsten using the three-point bend test
[DE92-000099] N92-12116
High power impedance matchers with 100-ps risetime
[DE90-013516] N92-12150
Cathode applications to high-current diodes
[DE90-013290] N92-12172
Error analysis of a ratio pyrometer by numerical simulation
[DE90-011500] N92-12229
Error analysis by numerical simulation for a three-color pyrometer assuming a blackbody spectrum and a wavelength and temperature dependent emissivity
[DE90-011504] N92-12230
Lawrence Livermore National Laboratory Underwater Laser Imaging System (UWLIS) development project
[DE91-019001] N92-12258
On the formation of a joint during cold welding
[DE91-017672] N92-12275
A concept for treating dense-gas dispersion under realistic conditions of terrain and variable winds
[DE90-012892] N92-12343
A scalable coherent cache system with incomplete directory state
[DE90-010862] N92-12434
High energy SEU test results for the commercially available MIPS R3000 microprocessor and R3010 floating point unit
[DE91-019019] N92-12441
The radon transform for data reduction, line detection, and artificial neural network preprocessing
[DE90-013521] N92-12516
Algebraic calculation of stroboscopic maps of ordinary, nonlinear differential equations
[DE92-000220] N92-12578
Thulium heat source for high-endurance and high-energy density power systems
[DE91-018991] N92-12666
Stimulated Raman scattering in optical fibers: Polychromatic single-field numerical experiments
[DE90-012894] N92-12671
Laser conditioning of optical thin films
[DE90-013483] N92-12672
Large area laser conditioning of dielectric thin film mirrors
[DE90-013485] N92-12674
Fast Optically Sensitive Segmented Array (FOSSA)
[DE91-018997] N92-12684
Effects of oxide layers on optical properties and x ray hardness of Al-Be mirrors
[DE92-000476] N92-12687
Physics study of the application of an IFEL (Induction Free Electron Laser) to CIT (Compact Ignition Tokamak)
[DE90-011276] N92-12690
MTX (Microwave Tokamak Experiment) data acquisition and analysis computer network
[DE90-013066] N92-12694
MTX (Microwave Tokamak Experiment) diagnostics and timing system for FEL (Free Electron Laser) heating experiments
[DE90-013067] N92-12695
Flashlamp pumping of Nd:glass disk amplifiers
[DE90-013482] N92-12703
An analysis of grazing incidence metal mirrors in a laser ICF reactor driver
[DE92-000093] N92-12710
Radiation-driven evolution of low-mass x ray binaries and the formation of millisecond pulsars
[DE92-000123] N92-12975

LEICESTER UNIV. (ENGLAND).
X-ray observations of SS 433 and the QSO MR 2251-178 N92-12789

LIGHTWAVE ELECTRONICS CORP., MOUNTAIN VIEW, CA.
Coherent communication link using diode-pumped lasers
[NASA-CR-189248] N92-12149

LITEF, FREIBURG (GERMANY, F.R.).
Development and verification of software for flight safety critical systems N92-12469

LOCKHEED CANADA, INC., SITTSVILLE (ONTARIO).
Future ESM systems and the potential for neural processing N92-12526

LOCKHEED ENGINEERING AND SCIENCES CO., HAMPTON, VA.
A comparative analysis of XV-15 tiltrotor hover test data and WOPWOP predictions incorporating the fountain effect
[NASA-CR-189455] N92-11992

LOCKHEED ENGINEERING AND SCIENCES CO., HOUSTON, TX.
The effect of on/off indicator design on state confusion, preference, and response time performance, executive summary
[NASA-CR-185662] N92-12416
Ar-39-Ar-40 of achondrites: Evidence for a lunar-like cataclysm N92-12907
A liquidus phase diagram for a primitive shergottite N92-12916

LOS ALAMOS NATIONAL LAB., NM.
Hydrogen isotopic exchange over palladium metal
[DE90-012063] N92-12076
Resonance ionization mass spectrometry for materials analysis and characterization
[DE90-013187] N92-12077
Synthesis of Al/Al3Ti two-phase alloys by mechanical alloying
[DE92-000193] N92-12117
High explosives skid impact initiation study
[DE90-011266] N92-12133
Calculated non-linear magnetic field penetration of plasma opening switches
[DE90-013156] N92-12166
Internal dynamics of electrical discharges
[DE90-013161] N92-12169
The AFDM (Advanced Fluid Dynamics Model) program: Scope and significance
[DE90-010585] N92-12193
Lagrangian analysis, data covariance, and the impulse time integral
[DE92-000169] N92-12224
Richtmyer-Meshkov instability of shocked gaseous interfaces
[DE92-000308] N92-12225
Three-dimensional particle-in-cell modeling of relativistic electron beam production and transport for KrF laser pumping
[DE90-013050] N92-12247
Pulsed laser fluorometry for environmental monitoring
[DE90-013163] N92-12249
Improved KrF laser design for the Laboratory Microfusion Facility
[DE92-000171] N92-12259
Progress with the slotted-tube pulsed microwiggler
[DE92-000173] N92-12260
Rapid development of a measurement and control system for the Advanced Free-Electron Laser
[DE92-000178] N92-12261
Physics design of the high brightness linac for the advanced free-electron laser initiative at Los Alamos
[DE92-000179] N92-12262
Even harmonic lasing
[DE92-000207] N92-12263
Detection of structural degradation
[DE91-016040] N92-12293
Adaptation of an industrial application for an instructional laboratory in mechanical vibrations
[DE90-013692] N92-12295
Numerical simulation of plasticity at high strain rate
[DE91-011403] N92-12314
Three-dimensional forecasting models on a desk-top computer
[DE90-010612] N92-12347
Recent trends in waste-reduction efforts in the US manufacturing sector
[DE92-000197] N92-12357
Los Alamos National Laboratory's high-performance data system
[DE92-000223] N92-12442
Enhanced use of CLIPS at the Los Alamos National Laboratory
[DE92-000305] N92-12493
An assessment of the ModSim/TWOS parallel simulation environment
[DE91-011400] N92-12512
NFS as a user interface to a high-performance data system
[DE92-000254] N92-12515
Local states in one-dimensional CDW (Charge Density Wave) materials: Spectral signatures for polarons and bipolarons in MX chains
[DE90-013150] N92-12605
Direct measurements of neutrino mass
[DE92-000168] N92-12638
A high-efficiency neutron coincidence counter for small samples
[DE92-000183] N92-12639
Neutron flux enhancement at LASREF
[DE92-000196] N92-12640
Unitarity and pion production in relativistic heavy-ion collisions
[DE92-000212] N92-12641
Neutron Brillouin scattering in a metallic glass
[DE92-000219] N92-12642

The riddle of high-energy baryon number violation
[DE92-000253] N92-12644
P-d capture reactions in muonic molecules
[DE92-000256] N92-12645
Strangeness production at 200 GeV/Nucleon
[DE92-000259] N92-12646
Thermal generation and mobility of charge carriers in collective proton transport in hydrogen-bonded chains
[DE92-000306] N92-12649
Developments and directions in 200 MHz very high power RF at LAMPF
[DE92-000175] N92-12667
The TITAN reversed-field-pinch fusion reactor study, volume 3
[DE92-000139] N92-12727
An algorithm for determining EF coils from fixed-boundary equilibria applied to ARIES 3
[DE92-000170] N92-12730
Overview of the Los Alamos National Laboratory Inertial Confinement Fusion Program
[DE92-000199] N92-12731
Principles of superconductor imaging surface gradiometry
[DE90-008916] N92-12740
Phase diagram of anisotropic two-dimensional quarter-filled band of interacting electrons
[DE90-013171] N92-12748
Derivation of the high field semiconductor equations
[DE92-000249] N92-12763
Optical properties of MX chain materials: An extended Peierls-Hubbard model
[DE92-000314] N92-12764
Physical interpretation of supercoherent states and their associated Grassmann numbers
[DE92-000187] N92-12770
Monte Carlo approaches to effective field theories
[DE92-000198] N92-12771

LOUGHBOROUGH UNIV. OF TECHNOLOGY (ENGLAND).
On a generalized Polak-Ribiere algorithm for unconstrained minimization
[MATHS-REPT-A-148] N92-12491
General pole structure assignment in singular systems
[MATHS-REPT-A-147] N92-12554
Motivating quasi-Newton updates by preconditioned conjugate gradient methods
[MATHS-REPT-A-150] N92-12577

LOUISVILLE UNIV., KY.
Cosmos-1989 immunology studies
[NASA-CR-188970] N92-12389
Effect of space flight on interferon production - mechanistic studies
[NASA-CR-188972] N92-12390

LOWELL OBSERVATORY, FLAGSTAFF, AZ.
Studies of asteroids, comets, and Jupiter's outer satellites N92-12800
Outer planet studies N92-12829
Occultation studies of the solar system N92-12834
Groundbased cometary studies N92-12841
Detection of CN emission from (2060) Chiron N92-12860
The 1990 MB: The first Mars Trojan N92-12861
Deuterium on Venus: Observations from Earth N92-12879

LUCAS AEROSPACE LTD., BIRMINGHAM (ENGLAND).
Software methodologies for safety critical systems N92-12467

LUNAR AND PLANETARY INST., HOUSTON, TX.
Abstracts for the 54th Annual Meeting of the Meteoritical Society
[NASA-CR-188934] N92-12901

M

MARCONI UNDERWATER SYSTEMS LTD., WEYBRIDGE (ENGLAND).
Requirements and traceability management N92-12453

MARYLAND UNIV., COLLEGE PARK.
Observations of comets and asteroids N92-12793
Theoretical spectroscopy of comets N92-12794
Nonthermal synchrotron pair cascades in strong magnetic fields: A gamma ray burst emission model N92-12899

MASSACHUSETTS INST. OF TECH., CAMBRIDGE.
Control of catalytic hydrotreating selectivity with ammonia
[DE91-018084] N92-12091
Photometry of Pluto-Charon mutual events and Hirayama family asteroids N92-12799
Occultation studies of the solar system N92-12810
The cyclotron absorption line and eclipse transition phenomena of 4U 1538-52 N92-12944
Can a man-made universe be achieved by quantum tunneling without an initial singularity? N92-12951
Gravitational lenses: The current sample, recent results, and continuing searches N92-12953
Quasi-periodic oscillations in low-mass x ray binaries N92-12958

MASSACHUSETTS UNIV., AMHERST.
Ground-based millimeter wave Cloud Profiling Radar System (CPRS)
[DE91-016373] N92-12159
Radiative transfer in planetary atmospheres N92-12842
The evolution of young stellar object disks and their environment N92-12847
Radiative transfer in planetary atmospheres: Submillimeter-wave spectroscopy of comets N92-12885

MAX-PLANCK-INST. FUER EXTRATERRESTRISCHE PHYSIK, GARCHING (GERMANY, F.R.).
X ray radiation from Supernova 1987A. The results of the Kvant module in 1987-1989 N92-12970

MAX-PLANCK-INST. FUER PHYSIK UND ASTROPHYSIK, GARCHING (GERMANY, F.R.).
The MPE/UCB far-infrared imaging Fabry-Perot interferometer (FIFI)
[NASA-CR-185495] N92-12242
Generation of auroral kilometric radiation in upper hybrid wave-lower hybrid soliton interaction
[MPE-PREPRINT-202] N92-12364
Observations of x ray pulsars from the Kvant module N92-12949
Physical conditions and heating/cooling processes in high mass star formation regions
[MPE-PREPRINT-200] N92-12974
Third plasma harmonic radiation in type 2 bursts
[MPE-PREPRINT-203] N92-12982
MERLIN observations of 4C29.6 (3C59) and 4C35.37: Two radio structures misidentified with Seyfert galaxies
[MPE-PREPRINT-204] N92-12984

MCDONALD OBSERVATORY, AUSTIN, TX.
Physical observations of comets: Their composition, origin and evolution N92-12805
Radial velocity detection of extra-solar planetary systems N92-12806
Physical observations of comets: Their composition, origin and evolution N92-12864
The companion object to HD114762 N92-12865

MCGILL UNIV., MONTREAL (QUEBEC).
Analysis of cladded uniaxial single crystal fibers
[NRC-32596] N92-12678

MESSERSCHMITT-BOELKOW-BLOHM G.M.B.H., MUNICH (GERMANY, F.R.).
Resonance and control response tests using a control stimulation drive
[MBB-UD-0586-90-PUB] N92-12003
Launch site operations for Columbus Free Flyer and resupply mission
[MBB-UO-0153-91-PUB] N92-12034
MTFF operations
[MBB-UO-0075-91-PUB] N92-12043
The Columbus Free Flying Laboratory: Mechanical design aspects
[MBB-UO-0152-91-PUB] N92-12044
PVD layers for corrosion protection of high strength Al-alloys
[MBB-Z-0360-91-PUB] N92-12108
Helmet mounted sight and display testing
[MBB-UD-0594-91-PUB] N92-12421
Helicopter integrated helmet requirements and test results
[MBB-UD-0595-91-PUB] N92-12422
A threat management system N92-12535
Expert system for the Tornado ground-based check-out system N92-12536
Columbus Free Flyer Center: Tasks and manpower profiles
[MBB-UO-0154-91-PUB] N92-12588
Columbus Free Flying Laboratory (MTFF) logistics, transportation, and ground processing
[MBB-UO-0155-91-PUB] N92-12589
Requirements and possible technical solutions derived from the new airmobility concept of the German Army
[MBB-UD-0596-91-PUB] N92-12590

MICHIGAN UNIV., ANN ARBOR.
The acoustic emission characteristics of solidification and formation of casting defects in aluminum alloy 319 N92-12101
Incipient boiling in microgravity N92-12140

MIDWEST RESEARCH INST., GOLDEN, CO.
A PC-based telemetry system for acquiring and reducing data from multiple PCM streams
[DE91-002199] N92-12037
Ocean energy contract list, fiscal year 1990
[DE91-002177] N92-12333
Photovoltaics: New opportunities for utilities
[DE91-002168] N92-12334
Research on stable, high-efficiency, amorphous silicon multijunction modules
[DE91-015002] N92-12335
Immunological and biochemical effects of 60 Hz electric and magnetic fields in humans
[DE90-012546] N92-12402

MIDWEST RESEARCH INST., KANSAS CITY, MO.
Immunological and biochemical effects of 60 Hz electric and magnetic fields in humans
[DE90-012547] N92-12403

MINING AND METALLURGICAL INST., HOKKAIDO (JAPAN).
Survey on possibility to utilize effectively underground space
[DE92-703044] N92-12417

MISSION RESEARCH CORP., SANTA BARBARA, CA.
Automated threat response recommendation in environments of high data uncertainty using the Countermeasure Association Technique (CMAT) N92-12525

MITRE CORP., HOUSTON, TX.
Performance analysis of LAN bridges and routers N92-12501

MSE, INC., BUTTE, MT.
Compendium of MHD-related terminology
[DE90-012867] N92-12699
Magnetohydrodynamic projects at the CDIF
[DE92-000396] N92-12735

N

NATIONAAL INST. VOOR KERNFYSICA EN HOGE ENERGIEFYSICA, AMSTERDAM (NETHERLANDS).
A Linear Variable Differential Transfer (LVDT) conditioner for the bundle profile monitor of AmPS
[DIGEL-1991-1] N92-12178
Optimization on AmPS chicane magnets
[NIKHEF-K-AMPS/91-02] N92-12595
Manual for a pattern generator
[LINO-1991-2] N92-12665

NATIONAL ACADEMY OF SCIENCES - NATIONAL RESEARCH COUNCIL, WASHINGTON, DC.
Nd-142/Nd-144 in SNCs and early differentiation of a heterogeneous Martian mantle N92-12925
High-Energy Astrophysics. American and Soviet Perspectives
[NASA-CR-186558] N92-12933

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION, WASHINGTON, DC.
NASA reliability preferred practices for design and test
[NASA-TM-4322] N92-12286
Life sciences report 1987
[NASA-TM-105105] N92-12388
Aerospace medicine and biology: A continuing bibliography with indexes (supplement 354)
[NASA-SP-7011(354)] N92-12404
Aerospace medicine and biology: A continuing bibliography with indexes (supplement 355)
[NASA-SP-7011(355)] N92-12412
Reports of planetary astronomy, 1991
[NASA-TM-4329] N92-12792

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. AMES RESEARCH CENTER, MOFFETT FIELD, CA.
An assessment and application of turbulence models for hypersonic flows
[NASA-TM-105124] N92-11984
NASA Ames-Dryden integrated test facility: Presentation outline N92-12014
Planning systems for pioneer mission control N92-12021
Mission critical technology development N92-12031
Future applications of artificial intelligence to Mission Control Centers N92-12032
Analysis of minerals containing dissolved traces of the fluid phase components water and carbon dioxide
[NASA-CR-188993] N92-12083
A NASA/RAE cooperation in the development of a real-time knowledge based autopilot N92-12528
Volatiles in the outer solar system N92-12807
Detection of solid C(triple bond)N bearing materials on solar system bodies N92-12866
Interstellar organics and possible connections with the carbonaceous components of meteorites and IDPs N92-12902
Methanol in the sky with diamonds N92-12903
Nearby main sequence stars with cool circumstellar material N92-12904
Clathrate type 2 hydrate formation in vacuo under astrophysical conditions N92-12906
A guide to the use of theoretical models of the solar nebula for the interpretation of the meteoritic record N92-12912
Evaluation of the Strecker synthesis as a source of amino acids on carbonaceous chondrites N92-12920

Modification of amino acids at shock pressures of 3 to 30 GPA: Initial results N92-12926
Imaging analysis of LDEF craters N92-12927
Fractionation of terrestrial neon by hydrodynamic hydrogen escape from ancient steam atmospheres N92-12931

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. GODDARD SPACE FLIGHT CENTER, GREENBELT, MD.
Control center operations at the Goddard Space Flight Center N92-12023
Advanced technologies for Mission Control Centers N92-12028
Numerical and experimental study of curved and planar frequency selective surfaces with arbitrary illumination [NASA-TM-104540] N92-12185
The sensitivity of synthetic aperture radiometers for remote sensing applications from space [NASA-TM-100741] N92-12321
Space and Earth Science Data Compression Workshop [NASA-CP-3130] N92-12425
The moderate resolution imaging spectrometer: An EOS facility instrument candidate for application of data compression methods N92-12427
Data compression for data archival, browse or quick-look N92-12431
Techniques for containing error propagation in compression/decompression schemes N92-12433
Spectroscopic planetary detection N92-12808
Studies of thermal wave phenomena on the Jovian planets N92-12809
Advanced infrared astronomy N92-12826
Imaging studies of comets N92-12836
Studies of thermal wave phenomena on the Jovian planets N92-12867
Time-lapse CCD imagery of plasma-tail motions in Comet Austin N92-12874
Ground based infrared measurements of the global distribution of ozone in the atmosphere of Mars N92-12875
Ethylene line emission from the North Pole of Jupiter N92-12876
The large-scale surface brightness distribution of the x ray background N92-12961
X ray emission from active galactic nuclei N92-12962

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. HUGH L. DRYDEN FLIGHT RESEARCH FACILITY, EDWARDS, CA.
Development of a pneumatic high-angle-of-attack flush airdata sensing (HI-FADS) system [NASA-TM-104241] N92-11994

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. JOHN F. KENNEDY SPACE CENTER, COCOA BEACH, FL.
Kennedy Space Center Launch Processing System (LPS) and the Test Checkout and Monitoring System 2 (TCMS2) N92-12013
Determination of the effects of wind-induced vibration on cylindrical beams [NASA-TM-103824] N92-12300

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. LYNDON B. JOHNSON SPACE CENTER, HOUSTON, TX.
Control Center Technology Conference Proceedings [NASA-CP-10081] N92-12010
Space shuttle Mission Control Center upgrade N92-12015
Space station control center architecture N92-12016
Real Time Data System (RTDS) N92-12019
Real Time Data System (RTDS) N92-12025
MacSPOC: Orbital trajectory calculations on a laptop computer N92-12027
MOD control center automated information systems security evolution N92-12030
Atomic oxygen interaction with spacecraft materials: Relationship between orbital and ground-based testing for materials certification [NASA-TM-105449] N92-12046
Method for producing oxygen from lunar materials [NASA-CASE-MSC-21759-1] N92-12079
Networking at NASA. Johnson Space Center N92-12498
Observational studies of the exospheres of the Moon and Mercury N92-12839
Compositional studies of primitive asteroids N92-12853
Sodium and potassium in the lunar atmosphere N92-12884
Compositional studies of primitive asteroids N92-12893
Degradation studies of Martian impact craters N92-12905
Ar-39-Ar-40 of achondrites: Evidence for a lunar-like cataclysm N92-12907
Aqueous alteration on the parent bodies of carbonaceous chondrites: Computer simulations of late-stage oxidation N92-12908
Mineralogy of an unusual Cr-rich inclusion in the Los Martinez (L6) chrondritic breccia N92-12909
The composition of meteoroids impacting LDEF N92-12910
Distribution of silicon between kamacite and taenite N92-12911
Low temperature annealing and cathodoluminescence studies of type 1 chondrule compositions N92-12913
Cosmogenic Ar-36 from neutron capture by Cl-35 in the Chico L6 chondrite: Additional evidence for large shielding N92-12914
Cs-135 - Ba-135: A new cosmochronometric constraint on the origin of the Earth and the astrophysical site of the origin of the solar system N92-12915
Extraterrestrial water of possible Martian origin in SNC meteorites: Constraints from oxygen isotopes N92-12917
The origin of amorphous rims on lunar plagioclase grains: Solar wind damage or vapor condensates N92-12918
Transmission electron microscopy of an interplanetary dust particle with links to CI chondrites N92-12919
Microprobe studies of microtomed particles of white druse salts in shergottite EETA 79001 N92-12921
Relationships among basaltic lunar meteorites N92-12922
Dynamic crystallization characteristics of enstatite chondrite chondrules N92-12923
Olivines in angrite LEW 87051: Phenos or xenos N92-12924
Nd-142/Nd-144 in SNCs and early differentiation of a heterogeneous Martian mantle N92-12925
Carbon and oxygen isotope composition of carbonates from an L6 chondrite: Evidence for terrestrial weathering from the Holbrook meteorite N92-12928
Iddingsite in the Nakhla meteorite: TEM study of mineralogy and texture of pre-terrestrial (Martian?) alterations N92-12929
Carbonate and sulfate minerals in the Chassigny meteorite N92-12930
Mineralogy and matrix composition of CR chondrites Renazzo and EET 87770, and ungrouped chondrites Essebi and MAC 87300 N92-12932

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. LANGLEY RESEARCH CENTER, HAMPTON, VA.
Investigation of the aeroelastic stability of the AFW wind-tunnel model using CAP-TSD [NASA-TM-104142] N92-11977
On simple aerodynamic sensitivity derivatives for use in interdisciplinary optimization [NASA-TM-104145] N92-11985
Computer programs for the calculation of dual sting pitch and roll angles required for an articulated sting to obtain angles of attack and sideslip on wind-tunnel models [NASA-TM-104161] N92-12007
Thermal design and test results for SUNLITE ultra-stable reference cavity [NASA-TM-104117] N92-12045
CARS temperature measurements in a hypersonic propulsion test facility N92-12049
A process for preparing an assembly of an article and a soluble polyimide which resists dimensional change, delamination, and debonding when exposed to changes in temperature [NASA-CASE-LAR-14763-1] N92-12121
An analytical and experimental study to investigate flutter suppression via piezoelectric actuation [NASA-TM-893240] N92-12173
Vacuum-isolation vessel and method for measurement of thermal noise in microphones [NASA-CASE-LAR-14567-1-CU] N92-12174
Method of recertifying a loaded bearing member [NASA-CASE-LAR-14168-1] N92-12302
Large angle transient dynamics (LATDYN) documentation. Post-processor manual [NASA-TM-104126] N92-12309
Helicopter main-rotor speed effects: A comparison of predicted ranges of detection from the aural detection program ICHIN and the electronic detection program ARCAS [NASA-TM-104134] N92-12598

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. LEWIS RESEARCH CENTER, CLEVELAND, OH.
The design and performance estimates for the propulsion module for the booster of a TSTO vehicle [NASA-TM-105299] N92-11995
Evaluation of components, subsystems, and networks for high rate, high frequency space communications [NASA-TM-105274] N92-12151
Modal interaction in linear dynamic systems near degenerate modes [NASA-TM-105315] N92-12316
Bibliography of Lewis Research Center technical publications announced in 1990 [NASA-TM-103753] N92-12786

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. MARSHALL SPACE FLIGHT CENTER, HUNTSVILLE, AL.
Huntsville Operations Support Center N92-12024
Automating a spacecraft electrical power system using expert systems [NASA-TP-3161] N92-12052
Atmospheric environment for Space Shuttle (STS-37) launch [NASA-TM-103556] N92-12375

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. PASADENA OFFICE, CA.
Integrated, non-volatile, high-speed analog random access memory [NASA-CASE-NPO-17998-1-CU] N92-12438

NATIONAL AEROSPACE LAB., AMSTERDAM (NETHERLANDS).
A knowledge-based assistant for diagnosis in aircraft maintenance N92-12538
Reasoning with uncertain and incomplete information in aerospace applications N92-12544
Time-reversion of a hybrid state stochastic difference system [NLT-TP-89014-U] N92-12585

NATIONAL DEFENCE RESEARCH ESTABLISHMENT, UMEA (SWEDEN).
Research needs for improvement of protection against explosive or toxic industrial chemicals hazards [FOA-C-40286-4.5] N92-12147
Beta-lactamase genes of Streptomyces badius, Streptomyces cacaoi and Streptomyces fradiae: Cloning and expression in Streptomyces lividans N92-12394
Molecular analysis of beta-lactamases from four species of Streptomyces: Comparison of amino acid sequences with those of other beta-lactamases N92-12395
Transcriptional induction of Streptomyces cacaoi beta-lactamase by a beta-lactam compound N92-12396
Mutagenic analysis of the S. fradiae beta-lactamase promoter N92-12397
Chromogenic identification of promoters in Streptomyces lividans by using an ampC beta-lactamase promoter-probe vector N92-12398
Characterization of a rotating drum for long term studies of aerosols [FOA-C-40261-4.5] N92-12399
Biological dosimetry: A review of methods available for determination of ionizing radiation dose [FOA-C-40282-4.3] N92-12400
The total defence radiation protection organization. A study of its capability [FOA-C-40285-4.3] N92-12773

NATIONAL ENVIRONMENTAL SATELLITE SERVICE, WASHINGTON, DC.
Interactive digital image display and analysis system (IDIDAS) user's guide [NOAA-TR-NESDIS-59] N92-12470

NATIONAL GEOPHYSICAL DATA CENTER, BOULDER, CO.
Solar-geophysical data number 561, May 1991. Part 1: (Prompt reports). Data for April, March 1991, and late data [PB91-217331] N92-12980
Solar-geophysical data number 561, May 1991. Part 2: (Comprehensive reports): Data for November 1990 and miscellaneous [PB91-217349] N92-12981

NATIONAL INST. FOR FUSION SCIENCE, NAGOYA (JAPAN).
Magnetohydrodynamic cellular automata [NIFS-16] N92-12707
Magnetic field structure near the plasma boundary in helical systems and divertor tokamaks [NIFS-17] N92-12708

NATIONAL OCEAN SERVICE, ANCHORAGE, AK.
Outer continental shelf environmental assessment program. Volume 73: Final Reports of principal investigators [PB91-204917] N92-12382

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, IDAHO FALLS, ID.
Climate Monitoring and Diagnostics Laboratory no. 18 [PB91-205559] N92-12371

NATIONAL OPTICAL ASTRONOMY LAB. TUCSON, AZ.
Analysis and interpretation of CCD data on P/Halley and physical parameters and activity status of cometary nuclei at large heliocentric distance N92-12797
Galileo-related ground-based observations of the Jovian System N92-12798
Halley's spin state determined N92-12858
Io's atmosphere detected by ground-based microwave spectroscopy N92-12859

NATIONAL PHYSICAL LAB., TEDDINGTON (ENGLAND).
Random uncertainties in the surface spectroscopies
[NPL-DMM(A)-26] N92-12087
A numerically-stable algorithm for calibrating single six-ports for national microwave reflectometry
[NPL-DES-102] N92-12158
Linearisation of diode detectors for use in a multistate reflectometer
[NPL-DES-104] N92-12241
The far infrared optical constants of some common polymers
[NPL-DES-111] N92-12682

NATIONAL RESEARCH COUNCIL OF CANADA, BOUCHERVILLE (QUEBEC).
Physicochemical characterization of high-performance fibre-reinforced organic-matrix composites. Part 6: Methods for quality control of matrix chemistry
[NRC-28667-PT-6] N92-12061
Tensile properties of injection molded long fiber thermoplastic composites
[NRC-29456] N92-12062
I.S.O. international program on the study of atmospheric corrosion: Results of first year exposure at Boucherville, October 1986 - October 1987
[NRC-28896] N92-12106
Ageing characteristics of dendritic and non-dendritic (stir-cast) Zn-Al alloy (ZA-27)
[NRC-28906] N92-12107
Physicochemical investigation of the compatibilization of polyolefin/polyamide blends: Morphology, thermal analysis, and specific interactions
[NRC-29455] N92-12124
Ultrasonic investigation of amorphous polymers (polystyrene) in a wide range of temperature and pressure. 1: Introduction, method, technique, and results
[NRC-29718] N92-12125
Modelling the cure of Narmco 5208: A method for determining the chemical state of the prepreg
[NRC-29449] N92-12126
Processing-morphology relationships of compatibilized polyolefin/polyamide blends. Part 1: The effect of an ionomer compatibilizer on blend morphology
[NRC-29094-PT-1] N92-12127
Determination of the impact fracture parameters in ductile polymers
[NRC-28433] N92-12128
Design of a long isotropic buffer rod
[NRC-28903] N92-12290
Single-column ion chromatography of passive monitors for atmospheric pollution
[NRC-28893] N92-12352
Backward collinear acousto-optic interactions in bulk materials
[NRC-29095] N92-12679
Crystallization behavior and effect of thermal history on fracture performance of glass flake reinforced polypropylene
[NRC-29450] N92-12752

NATIONAL RESEARCH COUNCIL OF CANADA, OTTAWA (ONTARIO).
Wind tunnel tests on A4, A4.1, and A4.2 2-D airfoil models in the IAR 5-ft. wind tunnel: Boeing Commercial Airplane Company and Institute for Aerospace Research collaborative work program
[NRC-IAR-C3] N92-11975
The BCAC/IAR collaborative research program to investigate the sidewall boundary layer effects in the IAR/NRC 2-D High Reynolds Number Test Facility
[NRC-HSA-434] N92-11976
Tracking performance requirements for rotorcraft instrument approaches to reduced minima. Phase 1: Preliminary study
[NRC-32137-PHASE-1] N92-11988
Tutor aft fuselage and empennage full-scale fatigue test: Resolution of horizontal stabilizer installation difficulties
[NRC-LTR-ST-1804] N92-11990
Corrosion and your aircraft
[NRC-30465] N92-11991
Numerical verification of NISA 2 finite element analysis of the cracked 5th stage compressor disc of J-85 jet engine
[NRC-LTR-ST-1792] N92-11997
Humidity effects on gas turbine performance
[NRC-30241] N92-11998
Preliminary analysis of baseline vibration data from Allison T56-A-14FE engine and reduction gearbox
[NRC-31578] N92-11999
Fuel flow measurement in gas turbine testing
[NRC-29808] N92-12000
A derivation of gross thrust for a sea-level jet engine test cell
[NRC-30165] N92-12001
A brief review of wrought aluminum alloy metal matrix composites reinforced by silicon carbide whiskers
[NRC-LTR-ST-1765] N92-12058
Improved specimen support jig for hot-wet compression testing
[NRC-LTR-ST-1790] N92-12059
The calculation of theoretical coherent anti-Stokes Raman spectra
[NRC-29810] N92-12085
Metallic corrosion: Causes and case histories
[NRC-LTR-ST-1798] N92-12105
Photoelastic coating method strain survey of cruciform specimen
[NRC-LTR-ST-1747] N92-12123
Flight Research Laboratory T-33 microgravity facility flight operations, 1986 to 1990
[NRC-32136] N92-12142
Constraint propagation through electromagnetic interaction topologies
[NRC-31761] N92-12154
Bulletin of the Division of Electrical Engineering, 1987-1988, volume 3, number 2
[NRC-29078-VOL-3-NO-2] N92-12177
Turbulent boundary layer solution for two-dimensional compressible flow using mixing length and K-epsilon turbulence models
[AD-A233771] N92-12213
TURCOM: A computer code for the calculation of transient, multi-dimensional, turbulent, multi-component chemically reactive fluid flows. Part 2: Compressible and combusting flow
[NRC-29287-PT-2] N92-12214
Calibration of an FTI Omnitrak ballistic flow calibrator system
[NRC-29847] N92-12233
The NRCC three-dimensional image data files
[NRC-29077] N92-12234
A system for calibrating the wrist-mounted laser range finder
[NRC-29799] N92-12252
General introduction to engineering failure analysis
[NRC-LTR-ST-1773] N92-12288
Acousto-ultrasonics for adhesive bond evaluation
[NRC-LTR-ST-1799] N92-12289
A feasibility study of using ABAQUS finite element analysis for creep with microstructural material damage
[NRC-LTR-ST-1791] N92-12305
Kapuskasing field study relating atmospheric stability to wind drift from aerial forest spray operations
[NRC-LTR-UA-99] N92-12372
Ergonomics applied to operational systems in space stations
[NRC-28710] N92-12418
Segmentation of complex geometric forms by the curvature method
[NRC-31210] N92-12475
Direct estimation of deformable motion parameters from a range image sequence
[NRC-31757] N92-12476
CAD/CAM activities at NRC: 1988
[NRC-29225] N92-12477
Supervisory autonomy in telerobotics
[NRC-31743] N92-12546
A method of computing smooth transitions between a sequence of straight line paths for an autonomous vehicle
[NRC-31776] N92-12547
Algebraic error analysis for surface curvatures of 3-D range images
[NRC-30297] N92-12559
On the theory of impulse breakdown in gases
[NRC-31510] N92-12711
Simple model of the gaseous plasma and its soliton solutions
[NRC-30824] N92-12712
An overview of realtime expert systems
[NRC-31759] N92-12783

NAVAL AIR DEVELOPMENT CENTER, WARMINSTER, PA.
AI for RPVs, Sensor Driven Airborne Replanner (SDAR), for a Robotic Aircraft Sensor Platform (RASP)
N92-12534

NAVAL OBSERVATORY, WASHINGTON, DC.
Search for planet X N92-12816

NAVAL SHIP RESEARCH AND DEVELOPMENT CENTER, ANNAPOLIS, MD.
Influences of expanding monomer on carbon fiber reinforced epoxy composites 2
[AD-A240583] N92-12057

NAVAL WEAPONS CENTER, CHINA LAKE, CA.
Coprocessor support for real-time Ada N92-12454
Analyst workbench N92-12464

NEW ENERGY DEVELOPMENT ORGANIZATION, TOKYO (JAPAN).
Results and the future of research, part 2
[DE90-503494] N92-12987

NEW MEXICO STATE UNIV., LAS CRUCES.
Long term changes in reflectivity and large scale motions in the atmosphere of Jupiter and Saturn N92-12795
A study of the temporal behavior of the vertical structure of Jupiter's atmosphere N92-12976

NEW YORK UNIV., NEW YORK.
Plasma properties
[DE90-012865] N92-12693

NORTHEASTERN UNIV., BOSTON, MA.
Topics in gauge theories and the unification of elementary particle interactions
[DE90-013435] N92-12603

NORWEGIAN DEFENCE RESEARCH ESTABLISHMENT, KJELLER.
SAR imaging of vortex ship wakes. Volume 3: An overview of pre-ERS-1 observations and models
[FFI-91/7007-VOL-3] N92-12157
A tunable continuous-wave titanium-doped sapphire laser
[FFI-91/7006] N92-12254
The effect of berming on the response of structures subjected to nearby detonations
[FFI-91/4005] N92-12310
Comparison of some different formulae for ground shock prediction
[FFI-90/4006] N92-12363
Ocean/bottom acoustic interaction with arbitrary bottom profile
[FFI-91/7009] N92-12386
The ODE formulation of hyperbolic PDE's discretized by the spectral collocation method
[FFI-91/7011] N92-12576
Anomalous dispersion in gases derived from the optical depth. Theoretical treatment: Line by line calculations
[NDRE/PUBL-91/1002] N92-12675

NUCLEAR UTILITY SERVICES, INC., GAITHERSBURG, MD.
Update of Ulysses FSAR results using updated NASA probabilities
[DE90-012504] N92-12008

O

OAK RIDGE NATIONAL LAB., TN.
Characteristics of an electron-beam rocket pellet accelerator
[DE92-000073] N92-12053
Interface effects and fracture in Nicalon/SiC composites
[DE90-012925] N92-12055
Spatial variability in the tensile strength of an extruded nuclear-grade graphite
[DE91-018868] N92-12070
High-temperature corrosion of Nicalon(tm)/SiC composites
[DE92-000281] N92-12071
Chemical potential from integral equations using scaled particle theory
[DE90-011277] N92-12075
Measurements of heat and mass transfer coefficients during absorption of water vapor by lithium bromide and (Li,K,Na)NO3 mixtures
[DE91-014212] N92-12088
Diffraction by macromolecular fluids
[DE91-016219] N92-12089
An experimental study of the volatility of ammonium chloride from aqueous solutions to high temperatures
[DE91-017875] N92-12090
Determination of diffusion coefficients in liquids using the diaphragm cell method
[DE91-018403] N92-12093
Weldability of iron aluminides
[DE90-012722] N92-12096
Development of surface treatments and alloy modifications for corrosion-resistant oxide scales
[DE90-012723] N92-12097
Cryogenic testing of fluoropolymer-coated stainless steel tubing
[DE90-008022] N92-12098
Designing precipitation-strengthened iron-aluminides for high-temperature applications
[DE90-013832] N92-12100
Evaluation of the fabricability of advanced austenitic tubing
[DE91-017158] N92-12109
Creep in L1(2)-intermetallics
[DE91-018231] N92-12112
The effect of casting temperature on the fatigue properties of cast nickel aluminide alloys
[DE92-000432] N92-12118
Mechanical properties and microstructure of pressureless sintered duophase sialon
[DE92-000043] N92-12131
Alternative motor fuel use model: Model theory and design and user's guide
[DE90-012040] N92-12134

Designing equipment for use in gamma radiation environments
[DE90-012050] N92-12162
Dielectric-liquid pulsed power switch
[DE90-009425] N92-12168
Hardware development and initial subassembly test of a gas-fired Stirling/Rankine residential heat pump
[DE90-012203] N92-12194
Heat-transfer material
[DE91-017723] N92-12221
Experimental analysis of direct-expansion ground-coupled heat pump systems
[DE92-000420] N92-12226
Workshop on Scientific and Industrial Applications of Free Electron Lasers
[DE90-012038] N92-12245
Stiffness control of teleoperators with redundant, dissimilar kinematics
[DE90-011642] N92-12265
Autonomous trajectory generation for mobile robots with non-holonomic and steering angle constraints
[DE90-012298] N92-12268
Computer modeling of arc welds to predict effects of critical variables on weld penetration
[DE92-000428] N92-12283
Material and lubricant relationships in the tribology of internal combustion engines
[DE92-000674] N92-12284
A method for multiaxial fatigue life prediction using energy approaches
[DE91-018851] N92-12315
Report of a workshop on using remote sensing to estimate land use change
[DE90-011278] N92-12318
Conventional wallboard with latent heat storage for passive solar applications
[DE90-012136] N92-12325
Analysis of wallboard containing a phase change material
[DE90-012163] N92-12326
A summary of the status of biomass conversion technologies and opportunities for their use in Latin America
[DE90-012284] N92-12328
Global climate change and human health: Information needs, research priorities, and strategic considerations
[DE90-012599] N92-12342
Mercury as an environmental pollutant
[DE90-013392] N92-12349
Managing global climate change through international cooperation: Lessons from prior resource management efforts
[DE90-014699] N92-12350
Can sulfate fluxes in forest canopy throughfall be used to estimate atmospheric sulfur deposition?
[DE92-000044] N92-12356
A standard test set for numerical approximations to the shallow water equations in spherical geometry
[DE92-000385] N92-12365
On the vulnerability of electric power to geomagnetic storms
[DE90-013929] N92-12368
Nuclear Medicine Program
[DE92-000383] N92-12411
Using computer experiments to construct a cheap substitute for an expensive simulation model
[DE92-000421] N92-12494
On finding minimum-diameter clique trees
[DE92-000386] N92-12579
A Monte Carlo study of the light (q sup 2)(bar q sup 2) system
[DE92-000449] N92-12580
Electron transport in fast dielectric liquids at high applied electric fields
[DE90-009815] N92-12606
Detection system characteristics using Cf-252 ionization chambers
[DE90-011702] N92-12610
Nuclear power engineering in space
[DE90-012743] N92-12656
Experimental results from studies on nucleus-nucleus collisions at high energy
[DE90-012286] N92-12658
Atomic and molecular data for metallic impurities in fusion plasmas
[DE90-012213] N92-12688
Effect of the equilibrium magnetic field on plasma edge fluctuations
[DE90-012720] N92-12692
Resistive MHD turbulence
[DE90-012935] N92-12700
Recent progress in the development of materials for fusion reactors
[DE91-016283] N92-12722
Full-wave calculation of fast-wave current drive in tokamaks including k(sub (parallel)) upshifts
[DE92-000048] N92-12726
Tritium proof-of-principle pellet injector
[DE92-000390] N92-12734
The Ion Cyclotron Heating (ICH) system for BPX
[DE92-000426] N92-12736
Effects of ambient background gases on YBCO plume propagation under film growth conditions: Spectroscopic, ion probe, and fast photographic studies
[DE92-000431] N92-12737
Electromagnetic loads on ITER in-vessel components
[DE92-000672] N92-12739
Evidence of weak pair coupling in the penetration depth of bi-based high-Tc superconductors
[DE90-009415] N92-12741
Magnetization studies of irradiation modified single crystal Y1Ba2Cu3O7 superconductors: Flux creep and annealing effects
[DE91-018858] N92-12758
Properties of epitaxial YBa2Cu3O(7-delta)-based superconducting superlattices
[DE92-000423] N92-12765
Laser ablation synthesis and properties of epitaxial YBa2Cu3O(7-delta) / PrBa2Cu3O(7-delta) superconducting superlattices
[DE92-000447] N92-12766
Decision support system development using a migration approach
[DE91-018860] N92-12774
Practical implications of theories of uncertainty for uncertainty elicitation
[DE91-017949] N92-12782
The GAMMASPHERE
[DE92-000448] N92-12986

OAK RIDGE Y-12 PLANT, TN.
Extraction apparatus with pulsed columns for monitoring dispersed phase
[DE91-017680] N92-12209

OFFICE NATIONAL D'ETUDES ET DE RECHERCHES AEROSPATIALES, PARIS (FRANCE).
Thermographic gust wind tunnel measurements
[ONERA-RF-31/3409-PY] N92-11972
Vectorization and parallelization of the AEROLOG3D code in collaboration with Matra
[ONERA-RF-37/3479-CY] N92-12508

OFFICE NATIONAL D'ETUDES ET DE RECHERCHES AEROSPATIALES, TOULOUSE (FRANCE).
Formal specification of satellite telemetry: A practical experience N92-12456

OHIO STATE UNIV., COLUMBUS.
Theory of exotic superconducting and normal states of heavy electron and high T(sub c) materials
[DE90-012688] N92-12745

OXFORD UNIV. (ENGLAND).
Effects of wake and shock passing on the heat transfer to a film cooled transonic turbine blade N92-12201
Heat transfer and instrumentation studies on rotating turbine blades in a transient facility N92-12203
Blade surface pressure measurements on the rotor of a model turbine stage in a transient flow facility N92-12206
Structural and optical characterisation of Langmuir-Blodgett films for data storage applications N92-12780
Cataclysmic variables in globular clusters and low mass x ray binaries N92-12897

P

PACIFIC NORTHWEST LAB., RICHLAND, WA.
An integrated energy approach to providing power and propulsion for the Space Exploration Initiative
[DE92-000143] N92-12054
Vickers microindentation toughness of a sintered SiC in the median-crack regime
[DE92-000225] N92-12132
Particle measurement and brine chemistry at the Salton Sea Deep Well
[DE92-000031] N92-12337
Mobile Energy Laboratory energy-efficiency testing programs
[DE92-000039] N92-12338
Vertical integration of science, technology, and applications
[DE90-013552] N92-12344
Properties of liquid water and carbon dioxide from constant pressure-constant temperature molecular dynamics
[DE91-018219] N92-12633

PARIS-SUD UNIV., ORSAY (FRANCE).
Spectroscopic analysis of a discharge and a post discharge within a low pressure air stream
[ETN-91-90098] N92-12086

PENNSYLVANIA STATE UNIV., UNIVERSITY PARK.
A planar-fluorescence imaging technique for studying droplet-turbulence interactions in vaporizing sprays N92-12050
Planar laser imaging of sprays for liquid rocket studies N92-12051

PHILLIPS LAB., KIRKLAND AFB, NM.
A synergistic approach to reasoning for autonomous satellites N92-12522

PITTSBURGH UNIV., PA.
Probe molecule studies: Active species in alcohol synthesis
[DE92-000332] N92-12138
System-based component test problem: The design of optimum system based component test plans N92-12587

PLANETARY SCIENCE INST., TUCSON, AZ.
Planetary astronomy N92-12804
Studies of relationships among outer solar system small bodies and related objects N92-12818
Planetary astronomy N92-12863

POLITECNICO DI MILANO (ITALY).
The state variable method as a unifying approach to the study of semiconductor devices
[REPT-90-045] N92-12187
Mobile charge and electric field distributions in abrupt PN junctions: An approach with the state variable method
[REPT-90-051] N92-12188
DBMS problems on the evolution of relational model to object model
[REPT-90-069] N92-12488
Some simple bounds for approximations of sigmoidal functions in layered neural nets
[REPT-90-022] N92-12511
Machine learning: An approach based on classifier systems and evolutionary algorithms
[REPT-90-043] N92-12550
Constrained receding-horizon predictive control
[REPT-90-062] N92-12551
A bootstrapping approach to robot intelligence: First results
[REPT-90-068] N92-12552
New perspectives about default hierarchies formation in learning classifier systems
[REPT-91-002] N92-12553
Comments on: Stabilizability and detectability of discrete-time time-varying systems
[REPT-90-014] N92-12571
Difference and differential Riccati equations: A note on the convergence to the strong solution
[REPT-90-015] N92-12572
A minimum prediction error algorithm for estimation of periodic ARMA models
[REPT-90-016] N92-12573
Differential periodic Riccati equations: A note on the existence of an infinite number of periodic strong solutions
[REPT-90-020] N92-12574
On the convergence to the strong solution of periodic Riccati equations
[REPT-90-021] N92-12575
Optimal stochastic control of multirate sampled-data systems
[REPT-90-019] N92-12586
Spectral factorization of linear periodic systems with application to the optimal prediction of periodic ARMA models
[REPT-90-013] N92-12768
Control mechanisms in Italian business groups
[REPT-90-014] N92-12775
The stock exchange market and company groups
[REPT-90-015] N92-12776
The organization of an options market: Case of the European options market
[REPT-90-016] N92-12777
Has the European monetary system been instrumental for the convergence of inflation rates in Europe?
[REPT-90-007] N92-12787

POLYTECHNIC UNIV., BROOKLYN, NY.
Waves and fields in structural acoustics: Fluid-loaded elastic cylindrical and spherical shells N92-12597

PRINCETON UNIV., NJ.
Basic physics and cosmology from pulsar timing data N92-12971

PROVENCE UNIV., MARSEILLE (FRANCE).
Measurement of charge exchange reaction constants both at equilibrium and out of equilibrium in a Paul trap
[ETN-91-90103] N92-12361

PURDUE UNIV., WEST LAFAYETTE, IN.
Dynamic delamination crack propagation in a graphite/epoxy laminate
[NASA-CR-187226] N92-12063

Q

QUEENS UNIV., KINGSTON (ONTARIO).
Piezoelectric devices using sol gel thin films
[NRC-31370] N92-12751

R

RENSSELAER POLYTECHNIC INST., TROY, NY.
The TITAN reversed-field-pinch fusion reactor study, volume 3
[DE92-000139] N92-12727

RESEARCH INST. FOR ADVANCED COMPUTER SCIENCE, MOFFETT FIELD, CA.
Ames life science telescience testbed evaluation
[NASA-CR-188856] N92-12033
Some methods of encoding simple visual images for use with a sparse distributed memory, with applications to character recognition
[NASA-CR-188848] N92-12436
An empirical investigation of sparse distributed memory using discrete speech recognition
[NASA-CR-187893] N92-12437
Bibliography for computer security, integrity, and safety
[NASA-CR-188950] N92-12439
A highly parallel multigrid-like method for the solution of the Euler equations
[NASA-CR-188816] N92-12496
Networking as a Strategic Tool, 1991
[NASA-CR-188124] N92-12497
A distributed agent architecture for real-time knowledge-based systems: Real-time expert systems project, phase 1
[NASA-CR-188947] N92-12781

RESOURCES FOR THE FUTURE, INC., WASHINGTON, DC.
Processes for identifying regional influences of and responses to increasing atmospheric CO2 and climate change: The MINK project
[DE91-018606] N92-12353
Processes for identifying regional influences of and responses to increasing atmospheric CO2 and climate change: The MINK project
[DE91-018607] N92-12354
Processes for identifying regional influences of and responses to increasing atmospheric CO2 and climate change: The MINK project
[DE91-018608] N92-12355

ROCHESTER UNIV., NY.
Nuclear structure theory
[DE90-013949] N92-12609

ROCKWELL INTERNATIONAL CORP., CANOGA PARK, CA.
Composite load spectra for select space propulsion structural components
[NASA-CR-189048] N92-12306

ROCKWELL INTERNATIONAL CORP., DOWNEY, CA.
Ground support system methodology and architecture N92-12018

ROME AIR DEVELOPMENT CENTER, GRIFFISS AFB, NY.
Machine intelligence for survivable communications network management N92-12518
A distributed environment for testing cooperating expert systems N92-12519
Heuristic route optimization: A model for force level route planning N92-12520
C3I graphical applications N92-12541

ROYAL AEROSPACE ESTABLISHMENT, BEDFORD (ENGLAND).
Application of Eigenstructure Assignment to the control of powered lift combat aircraft
[RAE-TM-FS-1009] N92-12004
The development of a requirement specification for an experimental active flight control system for a variable stability helicopter: An Ada simulation in JSD N92-12466

ROYAL AEROSPACE ESTABLISHMENT, FARNBOROUGH (ENGLAND).
Integrating machine intelligence into the cockpit to aid the pilot N92-12533

ROYAL NETHERLANDS METEOROLOGICAL INST., DE BILT.
Storm calendar 1964-1990: Chronological survey of all storms (wind force 8 and higher) along the Dutch coast in the period 1964-1990
[KNMI-176] N92-12374
The wind profile in a wave flume N92-12380

RUTGERS - THE STATE UNIV., NEW BRUNSWICK, NJ.
Theory of inclusions in the elastic and elastic-plastic deformation of composite materials N92-12056

S

SANDIA NATIONAL LABS., ALBUQUERQUE, NM.
Slotted-wall research with disk and parachute models in the DSMA low-speed wind tunnel
[DE90-013631] N92-11966
Hypervelocity explosive launchers
[DE90-011713] N92-12036
Application of parallel computing to the Monte Carlo simulation of electron scattering in solids: A rapid method for profile deconvolution
[DE90-009322] N92-12072
Current issues in sol-gel reaction kinetics
[DE90-012226] N92-12074
Chemical analysis of trace substances from explosives
[DE91-017833] N92-12084
Gold sulfide replacements of cyanide solutions
[DE91-017981] N92-12111
Controlled microstructure oxide coating for chemical sensors
[DE90-012223] N92-12119
A semi-analytical model for pressure-time history of granular pyrotechnic materials in a closed system
[DE90-012761] N92-12135
Compaction of TiH(1.65)/KClO4 pyrotechnic powder during confined burn
[DE90-013199] N92-12136
Shock characterization of nitrocellulose-based gun propellant
[DE91-019057] N92-12137
Operations manual for reading VAK-3 ultrasonic seals using a data acquisition box
[DE90-013644] N92-12143
Development of a non-propagating explosives storage cabinet
[DE91-017923] N92-12148
Thermal effects on the Josephson series-array voltage standard
[DE90-008738] N92-12160
Characterization and development report for the 381558
[DE90-010395] N92-12161
Recovery of high field GaAs photoconductive semiconductor switches
[DE90-013062] N92-12163
The repetitive high energy pulsed power module
[DE90-013076] N92-12164
Channel cooling-techniques for repetitively pulsed magnetic switches
[DE90-013077] N92-12165
A repetitive, one microsecond, thirty-five kilojoule, two hundred kilovolt pulse generator
[DE90-013063] N92-12167
Thermal battery statistics and plotting programs
[DE90-013873] N92-12170
The behavior and testing implications of CMOS IC logic gate open circuits
[DE91-018679] N92-12189
Tests on photoconductive semiconductor switches for subnanosecond risetime, multimegavolt pulser applications
[DE91-018797] N92-12190
Thermal analysis report of the SANDAC V processor module
[DE91-018889] N92-12191
Microsensor research
[DE90-011801] N92-12227
Unattended optical surveillance equipment
[DE90-013403] N92-12228
Sandia severe electrostatic discharge tester: Version 3 (SSET), serial number 1
[DE91-018582] N92-12243
An astigmatic unstable resonator with an intracavity deformable mirror
[DE91-018815] N92-12257
Monocular 3D vision for a robot assembly environment
[DE90-010824] N92-12264
Integration of model-based and sensor-based control for a two-link flexible robot arm
[DE90-012183] N92-12266
A virtual sensor approach to robot kinematic identification: Theory and experimental implementation
[DE90-012186] N92-12267
Determination of the contact forces between a projectile and a hard target
[DE91-018354] N92-12281
Neutron interactions and contrast production in neutron radiography
[DE91-019064] N92-12294
Trends in dish-Stirling solar receiver designs
[DE90-011507] N92-12324
The potential impact of conservation and alternative energy sources on carbon dioxide emissions
[DE90-008346] N92-12339
The greenhouse effect and acid rain
[DE90-008347] N92-12340
Gridless electrostatic field solver for particle simulation codes in cylindrical geometry
[DE90-013602] N92-12445
Authentication of byte sequences
[DE92-000150] N92-12492
Requirements for a network storage service in a supercomputer environment
[DE92-000245] N92-12513
NFS(tm), Kerberos(tm), and UNICOS(r)
[DE92-000246] N92-12514
Design and testing of space-domain minimum average correlation energy (SMACE) filters for 2-D acousto-optic correlators
[DE91-019062] N92-12602
Fabrication and assembly of BOLVAPS (boil-off lithium vapor source) ceramic-option half anodes
[DE90-012012] N92-12661
Molecular to material design for anomalous-dispersion phase-matched second harmonic generation
[DE91-017999] N92-12683
Design and testing of 3-level optimal correlation filters
[DE91-019059] N92-12685
A laser-produced lithium ion source for pulsed-power inertial confinement fusion
[DE90-013401] N92-12702
Superconducting La2CuO(4+x) prepared by oxygenation at high pressure: A Raman scattering study
[DE90-012915] N92-12747
Stoichiometry and irradiation effects in melt grown Tl-Ca-Ba-Cu-O single crystals
[DE90-013365] N92-12749
Charge states of donor-hydrogen pairs in Si: A fragile balance
[DE91-018794] N92-12757
Solid state radioluminescent sources using tritium-loaded zeolites
[DE91-019061] N92-12759

SAVANNAH RIVER ECOLOGY LAB., AIKEN, SC.
Ecological Research between the Univ. of Georgia and DOE. Volume 1: Main report
[DE90-012109] N92-12341

SCHAFER (W. J.) ASSOCIATES, INC., CHELMSFORD, MA.
A plan for the study of the costs and environmental impact of fusion compared with alternative energy sources
[DE90-013068] N92-12696

SCIENCE APPLICATIONS INTERNATIONAL CORP., MCLEAN, VA.
West European magnetic confinement fusion research
[DE90-010911] N92-12704

SCIENCE APPLICATIONS INTERNATIONAL CORP., SAN DIEGO, CA.
Advanced laptop and small personal computer technology N92-12029

SCIENTIFIC ANALYSIS AND MODELLING, NEW CARROLLTON, MD.
Interpreting measurements obtained with the cloud absorption radiometer
[NASA-CR-189241] N92-12366

SCIENTIFIC RESEARCH ASSOCIATES, INC., GLASTONBURY, CT.
Velocity and pressure characteristics of a model SSME high pressure fuel turbopump
[NASA-CR-184239] N92-12273

SCRIPPS INSTITUTION OF OCEANOGRAPHY, LA JOLLA, CA.
Two-dimensional wave number spectra of small-scale water surface waves N92-12379
Autonomous ocean profiler
[AD-A239800] N92-12383

SENER INGENIERIA Y SISTEMAS S.A., MADRID (SPAIN).
A methodology for software specification and development based on simulation N92-12458

SHEFFIELD UNIV. (ENGLAND).
On the feasibility of numerical analysis of large creep problems N92-12298

SHERBROOKE UNIV. (QUEBEC).
Photoelastic coating method strain survey of cruciform specimen
[NRC-LTR-ST-1747] N92-12123

SMITHS INDUSTRIES AEROSPACE AND DEFENCE SYSTEMS LTD., CHELTENHAM (ENGLAND).
Military and civil software standards and guidelines for guidance and control N92-12452

SMITHS INDUSTRIES AEROSPACE AND DEFENSE SYSTEMS, INC., GRAND RAPIDS, MI.
Neural network solutions to mathematical models of parallel search for optimal trajectory generation N92-12527

SMITHSONIAN ASTROPHYSICAL OBSERVATORY, CAMBRIDGE, MA.
Astrometric observations of comets and asteroids and subsequent orbital investigations N92-12830
Radar studies in the solar system N92-12843
Radar studies in the solar system N92-12886
SOUTHWEST RESEARCH INST., SAN ANTONIO, TX.
Probabilistic Structural Analysis Methods (PSAM) for select space propulsion systems components
[NASA-CR-187199] N92-12307
SPACE RESEARCH ORGANIZATION NETHERLANDS, UTRECHT.
Observations of x ray pulsars from the Kvant module N92-12949
X ray radiation from Supernova 1987A. The results of the Kvant module in 1987-1989 N92-12970
SPACE TELESCOPE SCIENCE INST., BALTIMORE, MD.
Cluster research with x ray observations N92-12948
SPECTRA RESEARCH SYSTEMS, INC., HUNTSVILLE, AL.
Interactive Office user's manual
[NASA-CR-184203] N92-12447
STANFORD LINEAR ACCELERATOR CENTER, CA.
Bit-string scattering theory
[DE90-008013] N92-12555
Precision experiments in electroweak interactions
[DE90-013568] N92-12607
Constraints placed on the Higgs sector from precision electroweak measurements
[DE92-000236] N92-12643
JAZELLE: An enhanced data management system for high energy physics
[DE90-013571] N92-12662
STANFORD UNIV., CA.
Protein crystal growth in low gravity
[NASA-CR-188974] N92-12141
An experimental technique for investigation of instantaneous wall heat flux to a turbulent boundary layer in water N92-12200
Numerical simulation of compressible homogeneous turbulence N92-12204
Combined buoyancy-thermocapillary convection
[NASA-CR-187417] N92-12207
Solving stochastic linear programs on a hypercube multicomputer
[AD-A240630] N92-12472
STATE UNIV. OF NEW YORK, STONY BROOK.
Infrared variability of Jupiter and Saturn N92-12825
SUPERCONDUCTING SUPER COLLIDER LAB., DALLAS, TX.
First order tune shift calculations for transverse betatron dynamics
[DE92-000370] N92-12668
SVERDRUP TECHNOLOGY, INC., BROOK PARK, OH.
Vorticity dynamics of inviscid shear layers
[NASA-CR-189042] N92-12212

T

TECHNISCHE HOCHSCHULE, DARMSTADT (GERMANY, F.R.).
Fractional crystallization in polymer mixing
[ETN-91-90184] N92-12129
Optimality conditions for minimax tasks: An application example from communications engineering
[ETN-91-90169] N92-12156
The stability of graphite brushes at high velocity
[ETN-91-90176] N92-12184
Time stepping procedures for the nonstationary Stokes equations
[PREPRINT-1353] N92-12217
Time delay and finite differences for the nonstationary nonlinear Navier-Stokes equations
[PREPRINT-1359] N92-12218
Existence of three dimensional, steady, inviscid, incompressible flows with nonvanishing vorticity
[PREPRINT-1365] N92-12219
Laserable KrF(*)-excimer discharge with integrated preionization
[ETN-91-90177] N92-12253
The theory of variational inequalities and its application to contact problems with friction
[ETN-91-90183] N92-12562
Concept lattices with anti-endomorphism
[ETN-91-90182] N92-12594
Excess mixing volumes and specific interactions in organic molecule mixing
[ETN-91-90171] N92-12616
Examination of excitation and decay of giant resonances in Ca-40 by (e,e'x) coincidence experiments
[ETN-91-90174] N92-12617
Kinematic measurement of alpha particles accompanied by spontaneous fission of Cf-252
[ETN-91-90175] N92-12618
Quasi particles and fermi surfaces of heavy fermion systems
[ETN-91-90180] N92-12619
Nonlinear dynamics of optical ring resonators
[ETN-91-90173] N92-12680
Interpretation of ion energy spectra of laser plasmas, by recombination model
[ETN-91-90170] N92-12713
Nonlinear resonant absorption and wave breaking (Vlasov simulation of resonance excited plasma waves)
[ETN-91-90172] N92-12714
TECHNISCHE UNIV., BERLIN (GERMANY, F.R.).
A synthesis process for the optimization of the radiation properties of microstrip antennas
[ETN-91-90155] N92-12155
Starting currents in coils with conductive permeable core, allowing for induced eddy currents
[ETN-91-90158] N92-12180
Examination of sampling control systems for inverters of limited pulse repetition
[ETN-91-90159] N92-12181
Optimal realization of multistage cascade circuits
[ETN-91-90165] N92-12182
A contribution to the identification of internal faults in electrical machines
[ETN-91-90167] N92-12183
Selected methods for the investigation of linear, continuous and discrete-continuous mechanical models of a rail
[ILR-MITT-261(1991)] N92-12277
Computer aided modelization of ribosomic data
[ETN-91-90161] N92-12391
Pattern recognition in biosignals. Application to the sigma spindles in sleep electroencephalograms
[ETN-91-90166] N92-12407
Integration of applicative and object oriented programming
[ETN-91-90168] N92-12478
Synchronization of parallel processes by hardware: Realizations in asynchronous technique
[ETN-91-90164] N92-12509
Convexly constrained ill posed problems and their regularization, using iterative processes
[ETN-91-90156] N92-12560
A process for the calculation by approximation of the Preisach operator with usual differential equation applications
[ETN-91-90157] N92-12561
Orientation dependency of structural and chemical properties of Si(001) vicinal surfaces
[ETN-91-90154] N92-12754
TECHNISCHE UNIV., EINDHOVEN (NETHERLANDS).
On the limitations of Froude's actuator disc concept
[ETN-91-90136] N92-11973
The interaction of SiC with Fe, Ni, and their alloys
[ETN-91-90137] N92-12103
Electron beam irradiation of polymer blends
[ETN-91-90139] N92-12122
IC defect-sensitivity: Theory and computational models for yield prediction
[UDC-621.382.049.77:681.306(043)] N92-12175
Compact modeling of the dynamic behaviour of MOSFETs
[ISBN-90-9004212-1] N92-12176
Development of test methods for determining material deformability and yield stress, on the basis of intermetallic connections
[ETN-91-90130] N92-12303
Identification of the mechanical behavior of solid materials
[ISBN-90-386-0041-0] N92-12304
Perceived sharpness in static and moving images
[ETN-91-90138] N92-12413
Robustness of feedback stabilization: A topological approach
[ETN-91-90142] N92-12545
Few-body collisions in a weakly interacting Bose gas
[ETN-91-90307] N92-12621
Spin-exchange and dipole relaxation rates in atomic hydrogen: Rigorous and simplified calculations N92-12622
Decay of spin-polarized atomic hydrogen in the presence of a Bose condensate N92-12624
Nonsingular integral equation for two-body scattering and applications in two and three dimensions N92-12625
Spin-polarized atomic hydrogen in very strong magnetic fields N92-12626
Resonances in recombination of atomic hydrogen due to long-range H3 molecular states N92-12627
Novel approaches to the calculation of the electronic structure and dynamics of excited states: Application to trans-di-imide and ethylene
[ETN-91-90309] N92-12628
Semiclassical calculation of the vibrational structure of the (B) 1B(sub u) Rydberg state of trans-di-imide from ab initio CI potential energy surfaces N92-12629
Solving the discretized time-independent Schroedinger equation in the Lanczos procedure N92-12630
CEPA-type size consistency corrections for MRSDCI calculations, MRCEPA N92-12631
Three-dimensional quantum calculations on the ground and excited state vibrations of ethylene N92-12632
Reflectometry and transport in thermonuclear plasmas in the joint European Torus
[ETN-91-90135] N92-12709
A wall stabilized arc as a light source for spectroscopic techniques
[ETN-91-90308] N92-12715
Characteristic quantitites of a cascade arc used as a light source for spectroscopic techniques N92-12716
The continuum emission of an arc plasma N92-12717
The VUV emissivity of a high pressure cascade argon arc from 125 to 200 nm N92-12718
Infrared and ultraviolet spectroscopic ellipsometry using a cascaded arc as light source N92-12719
Photon enhanced chemical vapor deposition of carbon based thin films from toluene vapor N92-12720
The a-Si:H films produced by an expanding argon-silane plasma investigated with spectroscopic infrared ellipsometry N92-12721
Modular organization of domestic care in Weert (Netherlands)
[ISBN-90-6757-045-1] N92-12772
TENNESSEE UNIV., KNOXVILLE.
Magnetization studies of irradiation modified single crystal Y1Ba2Cu3O7 superconductors: Flux creep and annealing effects
[DE91-018858] N92-12758
TENNESSEE UNIV., TULLAHOMA.
Priority pollutant analysis of MHD-derived combustion products
[DE90-012630] N92-12689
TEXAS A&M UNIV., COLLEGE STATION.
New technology for linear colliders
[DE92-000081] N92-12664
TEXAS UNIV., AUSTIN.
Stochastic and collisional diffusion in two-dimensional periodic flows
[DE90-014335] N92-12198
A research program in finite element analysis and iterative solution on advanced processors
[DE90-013958] N92-12446
Finite orbit energetic particle linear response to toroidal Alfven Eigenmodes
[DE91-018418] N92-12612
Planetary astronomy N92-12844
A continued program of planetary study at the University of Texas McDonald Observatory N92-12852
Global scale auroral emissions on Jupiter N92-12891
Tentative identification of a newly discovered class of material on Io N92-12892
THOMSON-CSF, BAGNEUX (FRANCE).
Computer aided design of weapon system guidance and control with predictive functional control technique N92-12463
TOLEDO UNIV., OH.
An experimental analysis of lateral jet injection into confined swirling crossflows N92-12199
TORONTO UNIV. (ONTARIO).
Over forty years of continuous research at UTIAS on nonstationary flows and shock waves
[UTIAS-50] N92-11974
An experimental and computational investigation of an annular reverse-flow combustor
[UTIAS-338] N92-11996
Optimal control of large space structures using distributed gyricity: A continuum approach
[UTIAS-341] N92-12042
The modelling of turbulence and downbursts for flight simulators
[UTIAS-339] N92-12373
TRI-UNIV. MESON FACILITY, VANCOUVER (BRITISH COLUMBIA).
The laser system of the optically pumped ion source at TRIUMF
[DE90-013102] N92-12248
TUEBINGEN UNIV. (GERMANY, F.R.).
Observations of x ray pulsars from the Kvant module N92-12949
X ray radiation from Supernova 1987A. The results of the Kvant module in 1987-1989 N92-12970

U

UMEA UNIV. (SWEDEN).
A molecular analysis of beta-lactamases and their promotors in Streptomyces
[FOA-B-40392-4.4] N92-12393
UNIVERSITAET DER BUNDESWEHR MUENCHEN, NEUBIBERG (GERMANY, F.R.).
Semi-stochastic approximation by the Response Surface Methodology (RSM)
[ETN-91-90210] N92-12581

V

VALIC, HOUSTON, TX.
Cross-functional systems N92-12504

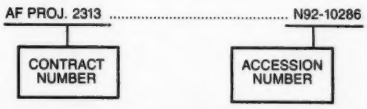
W

WASHINGTON UNIV., SAINT LOUIS, MO.
Studies of complex fragment emission in heavy ion reactions
[DE92-000532] N92-12653
Investigations of nuclear structure and nuclear reactions induced by complex projectiles
[DE92-000533] N92-12654
WASHINGTON UNIV., SEATTLE.
An experimental and numerical study of delamination propagation and arrest in composite beams and plates when subjected to low-velocity impact N92-12299
Close binary stars in globular clusters N92-12960
WEST VIRGINIA UNIV., MORGANTOWN.
Three-dimensional elastodynamic modeling and analysis of a flexible robot manipulator N92-12271
Implementation of a modified Johnson and Hindmarsh mass and energy model
[DE90-000488] N92-12329
WESTINGHOUSE ELECTRIC CORP., PITTSBURGH, PA.
Advanced study in solid transport: Rheological behavior of dense suspension
[DE90-009025] N92-12196
WESTINGHOUSE HANFORD CO., RICHLAND, WA.
A comparison of three methods for solving flow equations of two immiscible fluids in variably saturated media
[DE91-016945] N92-12220
WISCONSIN UNIV., MADISON.
Life testing and reliability with application in engineering systems
[AD-A240042] N92-12287
Development of high spectral resolution lidar technology
[DE92-000080] N92-12686
Total magnetic reconnection during a tokamak major disruption
[DE90-014711] N92-12706
Measurement of magnetic fluctuations at small spatial scales in the Tokapole 2 tokamak
[DE92-000161] N92-12728
Soft x-ray measurement of internal tearing mode structure in a reversed-field pinch
[DE92-000164] N92-12729
Ground-based observations of comets, the Jupiter plasma Torus, and Io N92-12840
WRIGHT LAB., WRIGHT-PATTERSON AFB, OH.
Adaptive tactical navigation program N92-12529
Pilot's associate: Evolution of a functional prototype N92-12531
Integrated Communications, Navigation, Identification, Avionics (ICNIA) expert system for fault tolerant avionics N92-12539
A development-memory approach for enhancing avionics software logistics N92-12540
Engineering Graphical Analysis Tool (EGAT) development program N92-12542
WYOMING UNIV., LARAMIE.
Infrared speckle interferometry and spectroscopy of Io N92-12820
Infrared speckle interferometry and spectroscopy of Io N92-12870

Z

ZAK TECHNOLOGIES, INC., CHAMPAIGN, IL.
Generalized finite element gap model
[AD-A240559] N92-12471

Typical Contract Number Index Listing

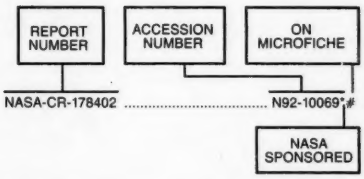


Listings in this index are arranged alphanumerically by contract number. Under each contract number the accession numbers denoting documents that have been produced as a result of research done under that contract are arranged in ascending order. The accession number denotes the number by which the citation is identified.

AF PROJ. 2304 ..... N92-12287
AF-AFOSR-0112-84 ..... N92-12585
AF-AFOSR-0256-87 ..... N92-12287
ARMINES/DRET-87-236 ..... N92-12068
B86-16X-7171-2A N92-12394
N92-12398
B88-16X-7171-4A N92-12395
N92-12396
B90-16X-07171-06A N92-12393
N92-12397
DA PROJ. 1L1-62618-AH-80 ..... N92-12471
DAAA15-85-C-0021 ..... N92-12471
DAAL03-91-G-0123 ..... N92-12557
DE-AC01-87NE-32134 ..... N92-12008
DE-AC01-88ER-30131 ..... N92-12244
DE-AC02-76CH-00016 ..... N92-12192
N92-12348
N92-12381
N92-12409
N92-12596
N92-12636
N92-12650
N92-12743
N92-12767
DE-AC02-76CH-03000 ..... N92-12443
N92-12637
N92-12651
N92-12652
N92-12655
DE-AC02-76ER-02220 ..... N92-12593
DE-AC02-76ER-03075 ..... N92-12593
N92-12650
DE-AC02-76ER-03130 ..... N92-12435
N92-12444
N92-12659
N92-12660
DE-AC02-76ER-03230 ..... N92-12604
DE-AC02-76ER-03274 ..... N92-12636
DE-AC02-79ET-10815 ..... N92-12689
DE-AC02-80ET-15601 ..... N92-12699
DE-AC02-83CH-10093 ..... N92-12037
N92-12333
N92-12334
N92-12335
DE-AC02-83ER-40107 ..... N92-12636
DE-AC02-89ER-40486 ..... N92-12611
DE-AC02-89ER-40509 ..... N92-12662
DE-AC03-76SF-00098 ..... N92-12078
N92-12195
N92-12330
N92-12424
N92-12495
N92-12608
N92-12669
N92-12670
N92-12742
N92-12744
N92-12750
N92-12785
DE-AC03-76SF-00515 ..... N92-12555
N92-12607
N92-12643
N92-12662
DE-AC03-84ER-53158 ..... N92-12727
DE-AC03-89ER-51114 ..... N92-12732
N92-12733
DE-AC04-76DP-00789 ..... N92-11966
N92-12036
N92-12072
N92-12074
N92-12084
N92-12089
N92-12111
N92-12119
N92-12135
N92-12136
N92-12137
N92-12143
N92-12148
N92-12160
N92-12161
N92-12163
N92-12164
N92-12165
N92-12167
N92-12170
N92-12189
N92-12190
N92-12191
N92-12227
N92-12228
N92-12243
N92-12257
N92-12264
N92-12266
N92-12267
N92-12281
N92-12294
N92-12324
N92-12339
N92-12340
N92-12445
N92-12492
N92-12513
N92-12514
N92-12602
N92-12661
N92-12683
N92-12685
N92-12702
N92-12747
N92-12749
N92-12757
N92-12759
DE-AC04-88DP-43495 ..... N92-12759
DE-AC05-84OR-21400 ..... N92-12053
N92-12055
N92-12070
N92-12071
N92-12075
N92-12088
N92-12089
N92-12090
N92-12093
N92-12096
N92-12097
N92-12098
N92-12100
N92-12109
N92-12112
N92-12118
N92-12131
N92-12134
N92-12162
N92-12168
N92-12194
N92-12221
N92-12226
N92-12245
N92-12265
N92-12268
N92-12283
N92-12284
N92-12315
N92-12318
N92-12325
N92-12326
N92-12328
N92-12342
N92-12349
N92-12350
N92-12356
N92-12365
N92-12368
N92-12411
N92-12494
N92-12579
N92-12580
N92-12606
N92-12610
N92-12656
N92-12658
N92-12688
N92-12692
N92-12700
N92-12722
N92-12726
N92-12734
N92-12736
N92-12737
N92-12739
N92-12741
N92-12758
N92-12765
N92-12766
N92-12774
N92-12782
N92-12986
DE-AC05-84OS-21400 ..... N92-12209
DE-AC06-76RL-01830 ..... N92-12054
N92-12132
N92-12337
N92-12338
N92-12344
N92-12353
N92-12354
N92-12355
N92-12633
DE-AC06-87RL-10930 ..... N92-12220
DE-AC07-76ID-01570 ..... N92-12440
N92-12657
N92-12701
DE-AC07-88ID-12735 ..... N92-12699
N92-12735
DE-AC08-88NV-10617 ..... N92-12358
DE-AC09-76SR-00819 ..... N92-12341
DE-AC22-88PC-88949 ..... N92-12196
DE-AC34-90DP-62349 ..... N92-12110
DE-AC35-89ER-40486 ..... N92-12668
DE-AI01-86CE-90239 ..... N92-12392
DE-AI01-88ER-30143 ..... N92-12704
DE-AI08-78ET-44802 ..... N92-12323
DE-AS03-88DP-10779 ..... N92-12691
DE-AS05-76ER-03956 ..... N92-12580
DE-AS05-81ER-40032 ..... N92-12636
DE-FC01-84CE-76246 ..... N92-12402
N92-12403
DE-FC21-87MC-24207 ..... N92-12329
DE-FC22-83FE-60149 ..... N92-12769
DE-FG02-84ER-60253 ..... N92-12387
DE-FG02-85ER-40233 ..... N92-12603
DE-FG02-85ER-45190 ..... N92-12623
DE-FG02-85ER-52118 ..... N92-12727
DE-FG02-85ER-53198 ..... N92-12706
N92-12728
N92-12729
DE-FG02-86ER-53223 ..... N92-12693
DE-FG02-86ER-60422 ..... N92-12367
DE-FG02-87ER-40316 ..... N92-12653
DE-FG02-87ER-40335 ..... N92-12615
DE-FG02-87ER-45326 ..... N92-12745
DE-FG02-88ER-13820 ..... N92-12223
DE-FG02-88ER-40406 ..... N92-12654
DE-FG02-88ER-40425 ..... N92-12609
DE-FG02-89ER-14079 ..... N92-12558
DE-FG02-89ER-69027 ..... N92-12369
N92-12370

DE-FG02-90ER-61058 ..... N92-12686
DE-FG02-90ER-61060 ..... N92-12159
DE-FG02-91ER-40613 ..... N92-12664
DE-FG03-86ER-52126 ..... N92-12727
DE-FG05-80ET-53088 ..... N92-12198
N92-12612
DE-FG05-85ER-13432 ..... N92-12073
DE-FG05-86ER-40272 ..... N92-12359
DE-FG05-87ER-25048 ..... N92-12446
DE-FG22-89PC-89775 ..... N92-12091
DE-FG22-90PC-90305 ..... N92-12138
DND-8464-90-RAG-06 ..... N92-12305
DRET-ARMINES-41086 ..... N92-12308
DRET-BC-87-001-54 ..... N92-11972
DRET-85-072 ..... N92-11980
DRET-86-003 ..... N92-12216
DRET-87-1187 ..... N92-12215
DRET-88-251 ..... N92-11979
DRET-89-34-001 ..... N92-12508
DRET-89-34-080-00-470-75-01 ..... N92-12086
DRET-89-34-060-00-47075-01 ..... N92-11978
DRET-89-002-00-40 ..... N92-12210
DRET-89-002-00-034 ..... N92-11971
DRET-89-003-03 ..... N92-12006
DRET-89-003-07 ..... N92-11982
DRET-89-174 ..... N92-12361
DRET-89-1054 ..... N92-12414
DRET-89-1170 ..... N92-11981
DSS-31950-9-0001/01-XSD N92-12751
EEC-ST2J-0451-C(GDF) N92-12378
EPA-68-DO-0106 ..... N92-12351
EPA-68-02-4456 ..... N92-12351
FA220787NRC06 ..... N92-11997
FE-46-158-86 ..... N92-12123
FE220787NRC01 ..... N92-11990
FMV-FFL-82260-89-262-73-001 ..... N92-11993
F33657-89-C-2175 ..... N92-12525
IAR PROJ. 07317 ..... N92-12105
IAR PROJ. 07332 ..... N92-11990
IAR PROJ. 07335 ..... N92-11997
IAR PROJ. 07336 ..... N92-12123
IAR PROJ. 07344 ..... N92-12105
N92-12305
JPL-957525 ..... N92-12144
JPL-958694 ..... N92-12429
JPL-959026 ..... N92-12429
NAE PROJ. 07344 ..... N92-12288
NAGW-273 ..... N92-12385
NAGW-1470 ..... N92-12860
N92-12861
NAGW-1864 ..... N92-12860
NAGW-1886 ..... N92-12860
NAG1-1145 ..... N92-12557
NAG2-208 ..... N92-12242
NAG2-554 ..... N92-11983
N92-11992
NAG2-614 ..... N92-12389
NAG3-211 ..... N92-12063
NAG3-811 ..... N92-12274
N92-12276
NAG5-1344 ..... N92-12319
NAG8-497 ..... N92-12952
NAG8-641 ..... N92-12448
NAG8-774 ..... N92-12141
NAG8-71501 ..... N92-12207
NAG9-181 ..... N92-12390
NASA ORDER C-99066-G N92-12316
NASA ORDER L-53177-C N92-12440
NASW-4234 ..... N92-12033
NASW-4383 ..... N92-12933
NASW-4574 ..... N92-12901
NAS1-18565 ..... N92-12002
NAS1-18605 ..... N92-12556
N92-12557
NAS1-19000 ..... N92-11992
NAS1-24382 ..... N92-12306
NAS3-24389 ..... N92-12307
NAS3-25266 ..... N92-12212
NAS5-29293 ..... N92-12960
NAS5-30116 ..... N92-12317
NAS5-30136 ..... N92-12366
NAS5-30487 ..... N92-12149
NAS7-918 ..... N92-12035
N92-12278
N92-12292
N92-12384
N92-12385
N92-12392
N92-12438
N92-12481
N92-12482
N92-12549
N92-12784
NAS8-36186 ..... N92-12273
NAS8-36643 ..... N92-12447
NAS8-36955 ..... N92-12139
N92-12231
N92-12239
N92-12269
N92-12279
N92-12360
N92-12362
N92-12448
NAS8-38075 ..... N92-12385
NAS9-17900 ..... N92-12416
NAS9-18057 ..... N92-12501
NATO-0312/88 ..... N92-12551
NATO-0543/88 ..... N92-12623
N92-12627
NCC2-387 ..... N92-12436
N92-12437
N92-12496
NCC2-408 ..... N92-12436
N92-12437
NCC2-446 ..... N92-12083
NCC9-16 ..... N92-12439
N92-12781
NGT-70050 ..... N92-12960
NSF AST-86-15325 ..... N92-12938
NSF DMS-89-22398 ..... N92-12557
NSF PHY-82-17853 ..... N92-12965
NSF PHY-86-04396 ..... N92-12965
N00014-89-C-6014 ..... N92-12383
N00014-89-J-1144 ..... N92-12385
N00014-89-J-1659 ..... N92-12472
N00014-90-C-0246 ..... N92-12676
N00014-91-C-0001 ..... N92-12048
RICIS PROJ. SE-19 ..... N92-12781
RICIS PROJ. SE-26 ..... N92-12439
STPA-85-95-009-66 ..... N92-12211
STPA-88-96-009 ..... N92-12235
STU-90-03619P N92-12601
W-31-109-ENG-38 ..... N92-12120
N92-12171
N92-12222
N92-12280
N92-12336
N92-12410
N92-12591
N92-12592
N92-12647
N92-12648
N92-12673
N92-12705
N92-12738
N92-12756
N92-12788
W-7405-ENG-36 ..... N92-12046
N92-12076
N92-12077
N92-12095
N92-12117
N92-12133
N92-12166
N92-12193
N92-12224
N92-12225
N92-12247
N92-12249
N92-12259
N92-12260
N92-12261
N92-12262
N92-12263
N92-12293
N92-12295
N92-12314
N92-12347
N92-12357
N92-12442
N92-12493
N92-12512
N92-12515
N92-12578
N92-12605
N92-12638
N92-12639
N92-12640
N92-12641
N92-12642
N92-12644
N92-12645
N92-12646
N92-12649
N92-12667
N92-12727
N92-12730
N92-12731
N92-12740
N92-12747
N92-12748
N92-12763
N92-12764
N92-12770
N92-12771
W-7405-ENG-48 ..... N92-12038
N92-12095
N92-12113
N92-12116
N92-12150
N92-12169
N92-12172
N92-12229
N92-12230
N92-12258
N92-12275
N92-12343
N92-12434
N92-12441
N92-12516
N92-12666
N92-12671
N92-12672
N92-12674
N92-12684
N92-12687
N92-12690
N92-12694
N92-12695
N92-12696
N92-12703
N92-12710
N92-12975
W-7405-ENG-82 ..... N92-12092
N92-12130
N92-12648
314-30-41-11-01 ..... N92-12481
316-30-19 ..... N92-12151
505-59-54-01 ..... N92-12007
505-62-21 ..... N92-12316
505-62-52 ..... N92-12212
505-63-5B N92-12063
505-63-50-06 ..... N92-11985
505-63-53-10 ..... N92-12309
505-64-40-01 ..... N92-12002
505-68-40 ..... N92-11994
505-69-40 ..... N92-11995
505-90-52-01 ..... N92-12556
N92-12557
506-59-11-01-00 ..... N92-12482
509-10-02-03 ..... N92-11977
532-06-36-02 ..... N92-12598
553-13-00 ..... N92-12306
N92-12307
572-10-30-06-34 ..... N92-12292
578-22-25 ..... N92-12385
578-22-26 ..... N92-12385
589-01-11-02 ..... N92-12045
590-32-14-01 ..... N92-12425
778-19-25-03-07 ..... N92-12392

Typical Report Number Index Listing



Listings in this index are arranged alphanumerically by report number. The accession number denotes the number by which the citation is identified. An asterisk (*) indicates that the item is a NASA report. A pound sign (#) indicates that the item is available on microfiche.

AD-A210523 ..... N92-12060 #
AD-A233771 ..... N92-12213 #
AD-A239800 ..... N92-12383 #
AD-A240042 ..... N92-12287 #
AD-A240356 ..... N92-12676 #
AD-A240559 ..... N92-12471 #
AD-A240583 ..... N92-12057 #
AD-A240630 ..... N92-12472 #

AD-D014961 ..... N92-12250
AD-D014974 ..... N92-12251
AD-D014975 ..... N92-12232
AD-D014976 ..... N92-12677

AD-E040117 ..... N92-12383 #

AECL-10087 ..... N92-12423 #

AFOSR-91-0720TR ..... N92-12287 #

AGARD-CP-499 ..... N92-12517 #
AGARD-CP-503 ..... N92-12449 #

AIAA-91-0420 ..... N92-12212* #
AIAA-91-3136 ..... N92-11995* #
AIAA-91-3423 ..... N92-12151* #

ALS/TR-90-006 ..... N92-12036 #
ALS/TR-91-006 ..... N92-12084 #

ANL-HEP-CP-90-32 ..... N92-12592 #
ANL-HEP-CP-90-36 ..... N92-12591 #
ANL-HEP-CP-91-76 ..... N92-12648 #

ANL-90/45 ..... N92-12222 #

ANL/APS-TM-6 ..... N92-12673 #

ANL/CP-72064 ..... N92-12756 #
ANL/CP-72704 ..... N92-12336 #
ANL/CP-72878 ..... N92-12647 #
ANL/CP-72983 ..... N92-12280 #
ANL/CP-74386 ..... N92-12410 #

ANL/ESD-9 ..... N92-12788 #

ANL/FPP/TM-256 ..... N92-12738 #

ANU-PRL-PP-89/6 ..... N92-12698 #
ANU-PRL-PP-89/8 ..... N92-12697 #

ASIPP-0011 ..... N92-12760 #
ASIPP-0013 ..... N92-12761 #
ASIPP-0015 ..... N92-12723 #
ASIPP-0016 ..... N92-12762 #

BARC-1538 ..... N92-12104 #

BCRS-90-27 ..... N92-12378 #

BNL-NUREG-43991 ..... N92-12192 #

BNL-43549 ..... N92-12767 #
BNL-44677 ..... N92-12743 #
BNL-44728 ..... N92-12348 #
BNL-45727 ..... N92-12596 #
BNL-46214 ..... N92-12650 #
BNL-46428 ..... N92-12381 #
BNL-46555 ..... N92-12636 #
BNL-46568 ..... N92-12409 #

BRL-CR-670 ..... N92-12471 #

BR302867 ..... N92-12004 #

CBPF-NF-034/89 ..... N92-12746 #

CERMA-90-44(LCBA) ..... N92-12414 #

CERN-90-10(V-2)-VOL-2 ..... N92-12663 #

CERT-RF-36/5005-32 ..... N92-11971 #
CERT-RF-67/5004-37 ..... N92-12211 #

CERT-RTS-55/5018-45 ..... N92-12210 #

CNEA-D-DP-FQP-109 ..... N92-12115 #

CNEA-NT-2/89 ..... N92-12282 #
CNEA-NT-6/90 ..... N92-12635 #

CNIC-00319 ..... N92-12634 #
CNIC-00325 ..... N92-12760 #
CNIC-00327 ..... N92-12761 #
CNIC-00329 ..... N92-12723 #
CNIC-00330 ..... N92-12762 #
CNIC-00336 ..... N92-12724 #
CNIC-00354 ..... N92-12114 #
CNIC-00361 ..... N92-12985 #
CNIC-00380 ..... N92-12725 #
CNIC-00383 ..... N92-12094 #

CONF-890403 ..... N92-12698 #
CONF-890525-1 ..... N92-12348 #
CONF-890874 ..... N92-12673 #
CONF-891292-1 ..... N92-12342 #
CONF-900135-11 ..... N92-12658 #
CONF-900196-1 ..... N92-12095 #
CONF-900264-7 ..... N92-12692 #
CONF-900289-5 ..... N92-12248 #
CONF-900328-2 ..... N92-12671 #
CONF-900368-10 ..... N92-12703 #
CONF-900466-55 ..... N92-12074 #
CONF-900466-71 ..... N92-12100 #
CONF-900528-2 ..... N92-12748 #
CONF-900546-10 ..... N92-12096 #
CONF-900546-11 ..... N92-12097 #
CONF-900546-12 ..... N92-12055 #
CONF-900557-11 ..... N92-12695 #
CONF-900557-12 ..... N92-12694 #
CONF-900563-9 ..... N92-12610 #
CONF-900656-3 ..... N92-12077 #
CONF-900738-2 ..... N92-12749 #
CONF-900773-3 ..... N92-12368 #
CONF-900792-7 ..... N92-12135 #
CONF-900792-8 ..... N92-12136 #
CONF-900801-10 ..... N92-12324 #
CONF-900801-13 ..... N92-12326 #
CONF-900801-14 ..... N92-12325 #
CONF-900801-18 ..... N92-12705 #
CONF-900801-21 ..... N92-12171 #
CONF-900803-3 ..... N92-12192 #
CONF-900804-11 ..... N92-12193 #
CONF-900806-1 ..... N92-12160 #
CONF-900806-2 ..... N92-12740 #
CONF-900806-7 ..... N92-12742 #
CONF-900806-8 ..... N92-12744 #
CONF-900817-1 ..... N92-12741 #
CONF-900823-1 ..... N92-12340 #
CONF-900823-2 ..... N92-12339 #
CONF-900874-3 ..... N92-12434 #
CONF-900877-2 ..... N92-12072 #
CONF-900894-1 ..... N92-12264 #
CONF-900894-2 ..... N92-12266 #
CONF-910617-4 ..... N92-12131 #

CONF-910617-5 ..... N92-12284 #
CONF-910640-45 ..... N92-12190 #
CONF-910662-2 ..... N92-12596 #
CONF-910801-23 ..... N92-12666 #
CONF-910860-2 ..... N92-12758 #
CONF-910864-1 ..... N92-12580 #
CONF-910869-13 ..... N92-12726 #
CONF-910881-9 ..... N92-12637 #
CONF-910881-11 ..... N92-12648 #
CONF-910881-14 ..... N92-12651 #
CONF-910881-16 ..... N92-12650 #
CONF-910881-17 ..... N92-12655 #
CONF-910882-1 ..... N92-12280 #
CONF-910901-9 ..... N92-12639 #
CONF-910920-3 ..... N92-12759 #
CONF-910938-2 ..... N92-12117 #
CONF-910938-3 ..... N92-12118 #
CONF-910952-1 ..... N92-12294 #
CONF-910968-2 ..... N92-12053 #
CONF-910968-3 ..... N92-12730 #
CONF-910968-4 ..... N92-12259 #
CONF-910968-5 ..... N92-12732 #
CONF-910968-6 ..... N92-12733 #
CONF-910968-7 ..... N92-12736 #
CONF-910968-14 ..... N92-12739 #
CONF-911011-1 ..... N92-12410 #
CONF-911048-2 ..... N92-12315 #
CONF-911084-3 ..... N92-12756 #
CONF-911088-1 ..... N92-12090 #
CONF-911111-1 ..... N92-12640 #
CONF-911187-1 ..... N92-12037 #
CONF-911195-1 ..... N92-12281 #
CONF-911197-1 ..... N92-12113 #
CONF-911198-1 ..... N92-12137 #
CONF-911209-1 ..... N92-12089 #
CONF-911213-3 ..... N92-12088 #
CONF-911224-1 ..... N92-12512 #
CONF-911225-1 ..... N92-12314 #
CONF-911240-1 ..... N92-12722 #
CONF-911241-1 ..... N92-12293 #
CONF-911244-1 ..... N92-12220 #
CONF-8906169-2 ..... N92-12657 #
CONF-8907134-11 ..... N92-12607 #
CONF-8909229-3 ..... N92-12036 #
CONF-8909297-2 ..... N92-12555 #
CONF-8910420-1 ..... N92-12195 #
CONF-8911192-3 ..... N92-12672 #
CONF-8911192-4 ..... N92-12674 #
CONF-9004190-10 ..... N92-12443 #
CONF-9004190-12 ..... N92-12444 #
CONF-9004190-15 ..... N92-12662 #
CONF-9004228-1 ..... N92-12591 #
CONF-9004228-1 ..... N92-12592 #
CONF-9005183-3 ..... N92-12701 #
CONF-9005195-2 ..... N92-12120 #
CONF-9006105-4 ..... N92-12689 #
CONF-9006105-8 ..... N92-12699 #
CONF-9006171-2 ..... N92-12119 #
CONF-9006175-2 ..... N92-12295 #
CONF-9006176-5 ..... N92-12163 #
CONF-9006176-6 ..... N92-12167 #
CONF-9006176-7 ..... N92-12164 #
CONF-9006176-8 ..... N92-12165 #
CONF-9006179-4 ..... N92-12172 #
CONF-9006210-1 ..... N92-12343 #
CONF-9006218-1 ..... N92-12605 #
CONF-9006219-1 ..... N92-12249 #
CONF-9007111-4 ..... N92-12702 #
CONF-9007111-6 ..... N92-12166 #
CONF-9007111-7 ..... N92-12247 #
CONF-9007112-3 ..... N92-12228 #
CONF-9007113-2 ..... N92-12700 #
CONF-9007114-1 ..... N92-12747 #
CONF-9008103-1 ..... N92-12265 #
CONF-9008103-2 ..... N92-12267 #
CONF-9008104-2 ..... N92-12328 #
CONF-9008117-1 ..... N92-12194 #
CONF-9008118-1 ..... N92-12038 #
CONF-9008122-1 ..... N92-12268 #
CONF-9008126-1 ..... N92-12370 #
CONF-9008126-2 ..... N92-12369 #
CONF-9009125-1 ..... N92-12606 #
CONF-9009125-2 ..... N92-12168 #

CONF-9009134-1 ..... N92-12347 #
CONF-9009136-1 ..... N92-12767 #
CONF-9009141-1 ..... N92-12076 #
CONF-9009152-1 ..... N92-12230 #
CONF-9009152-2 ..... N92-12229 #
CONF-9009192-1 ..... N92-12169 #
CONF-9010291-VOL-2 ..... N92-12663 #
CONF-9010397-1 ..... N92-12381 #
CONF-9011206 ..... N92-12614 #
CONF-9101113-1 ..... N92-12975 #
CONF-9103166-5 ..... N92-12638 #
CONF-9104298-1 ..... N92-12409 #
CONF-9104299-1 ..... N92-12643 #
CONF-9104300-1 ..... N92-12494 #
CONF-9105115-1 ..... N92-12649 #
CONF-9105242-2 ..... N92-12578 #
CONF-9105251-2 ..... N92-12770 #
CONF-9106107-2 ..... N92-12986 #
CONF-9106182-3 ..... N92-12731 #
CONF-9106194-7 ..... N92-12641 #
CONF-9106274-2 ..... N92-12636 #
CONF-9106274-3 ..... N92-12646 #
CONF-9106275-2 ..... N92-12112 #
CONF-9106281-1 ..... N92-12652 #
CONF-9107104-15 ..... N92-12356 #
CONF-9107105-52 ..... N92-12224 #
CONF-9107115-43 ..... N92-12683 #
CONF-9107115-48 ..... N92-12602 #
CONF-9107115-49 ..... N92-12685 #
CONF-9107115-50 ..... N92-12257 #
CONF-9107138-3 ..... N92-12225 #
CONF-9107146-3 ..... N92-12757 #
CONF-9107176-1 ..... N92-12763 #
CONF-9108118-3 ..... N92-12263 #
CONF-9108118-4 ..... N92-12261 #
CONF-9108118-5 ..... N92-12262 #
CONF-9108118-6 ..... N92-12260 #
CONF-9108142-3 ..... N92-12771 #
CONF-9108164-1 ..... N92-12633 #
CONF-9108168-1 ..... N92-12764 #
CONF-9108169-1 ..... N92-12226 #
CONF-9109102-1 ..... N92-12765 #
CONF-9109103-1 ..... N92-12642 #
CONF-9109121-2 ..... N92-12782 #
CONF-9109121-3 ..... N92-12774 #
CONF-9109122--2 ..... N92-12645 #
CONF-9109226-17 ..... N92-12054 #
CONF-9109247-1 ..... N92-12110 #
CONF-9109259-1 ..... N92-12111 #
CONF-9109259-6 ..... N92-12357 #
CONF-9109266-2 ..... N92-12070 #
CONF-9109276-1 ..... N92-12513 #
CONF-9109276-2 ..... N92-12442 #
CONF-9109276-3 ..... N92-12514 #
CONF-9109278-1 ..... N92-12647 #
CONF-9109280-1-DRAFT ..... N92-12493 #
CONF-9109285-1 ..... N92-12046* #
CONF-9109286-1 ..... N92-12766 #
CONF-9109286-2 ..... N92-12737 #
CONF-9110211-1 ..... N92-12189 #
CONF-9110218-1 ..... N92-12336 #
CONF-9110219-1 ..... N92-12515 #
CONF-9110221-1 ..... N92-12667 #
CONF-9110225-1 ..... N92-12668 #
CONF-9110226-1 ..... N92-12283 #

COO-3130TC-54 ..... N92-12435 #
COO-3130TC-53 ..... N92-12444 #
COO-3130TC-55 ..... N92-12659 #

CPIA-PUBL-557-VOL-1 ..... N92-12048 #

CRIE-T-88082 ..... N92-12099 #
CRIE-T-89005 ..... N92-12345 #
CRIE-T-89007 ..... N92-12346 #

CRIE-W-88041 ..... N92-12197 #

CSC/TM-89/6138 ..... N92-12317* #

CTN-91-60223 ..... N92-12268 #
CTN-91-60224 ..... N92-12372 #
CTN-91-60225 ..... N92-12546 #
CTN-91-60226 ..... N92-12559 #
CTN-91-60228 ..... N92-11986 #
CTN-91-60242 ..... N92-12153 #
CTN-91-60243 ..... N92-12154 #
CTN-91-60244 ..... N92-12711 #
CTN-91-60245 ..... N92-12289 #
CTN-91-60246 ..... N92-12058 #
CTN-91-60247 ..... N92-12059 #
CTN-91-60248 ..... N92-12105 #
CTN-91-60250 ..... N92-12678 #
CTN-91-60251 ..... N92-12751 #
CTN-91-60252 ..... N92-12042 #
CTN-91-60253 ..... N92-11996 #
CTN-91-60254 ..... N92-11974 #
CTN-91-60255 ..... N92-11975 #
CTN-91-60256 ..... N92-11976 #
CTN-91-60257 ..... N92-12142 #
CTN-91-60258 ..... N92-11997 #
CTN-91-60259 ..... N92-12305 #
CTN-91-60260 ..... N92-12123 #
CTN-91-60261 ..... N92-11990 #
CTN-91-60263 ..... N92-12213 #
CTN-91-60264 ..... N92-12783 #
CTN-91-60265 ..... N92-12475 #
CTN-91-60266 ..... N92-12712 #
CTN-91-60267 ..... N92-12476 #
CTN-91-60268 ..... N92-12547 #
CTN-91-60269 ..... N92-12373 #
CTN-91-60270 ..... N92-12060 #
CTN-91-60278 ..... N92-11988 #
CTN-91-60279 ..... N92-12290 #
CTN-91-60280 ..... N92-12252 #
CTN-91-60281 ..... N92-12124 #
CTN-91-60282 ..... N92-12106 #
CTN-91-60283 ..... N92-12125 #
CTN-91-60284 ..... N92-12061 #
CTN-91-60285 ..... N92-11998 #
CTN-91-60286 ..... N92-12085 #
CTN-91-60287 ..... N92-12214 #
CTN-91-60290 ..... N92-11991 #
CTN-91-60293 ..... N92-12418 #
CTN-91-60294 ..... N92-12233 #
CTN-91-60295 ..... N92-12291 #
CTN-91-60296 ..... N92-12752 #
CTN-91-60297 ..... N92-12107 #
CTN-91-60298 ..... N92-11999 #
CTN-91-60299 ..... N92-12679 #
CTN-91-60300 ..... N92-12477 #
CTN-91-60301 ..... N92-12126 #
CTN-91-60302 ..... N92-12352 #
CTN-91-60303 ..... N92-12000 #
CTN-91-60304 ..... N92-12001 #
CTN-91-60305 ..... N92-12127 #
CTN-91-60306 ..... N92-12177 #
CTN-91-60307 ..... N92-12128 #
CTN-91-60308 ..... N92-12234 #
CTN-91-60309 ..... N92-12062 #

CWI-AM-R9024 ..... N92-12408 #
CWI-AM-R9025 ..... N92-12486 #
CWI-AM-R9026 ..... N92-12564 #

CWI-BS-R9033 ..... N92-12582 #
CWI-BS-R9035 ..... N92-12583 #
CWI-BS-R9037 ..... N92-12584 #
CWI-BS-R9102 ..... N92-12548 #
CWI-BS-R9103 ..... N92-12563 #
CWI-BS-R9105 ..... N92-12479 #

CWI-CS-R9076 ..... N92-12480 #
CWI-CS-R9101 ..... N92-12186 #
CWI-CS-R9102 ..... N92-12483 #
CWI-CS-R9103 ..... N92-12510 #
CWI-CS-R9104 ..... N92-12484 #
CWI-CS-R9105 ..... N92-12485 #

CWI-NM-R9101 ..... N92-12565 #
CWI-NM-R9102 ..... N92-12566 #
CWI-NM-R9103 ..... N92-12567 #
CWI-NM-R9104 ..... N92-12568 #
CWI-NM-R9105 ..... N92-12569 #
CWI-NM-R9106 ..... N92-12487 #
CWI-NM-R9107 ..... N92-12570 #

CWP-110 ..... N92-12558 #

DCIEM-88-TR-16 ..... N92-11986 #

DCR/M-51739/F-90 ..... N92-12235 #

DE90-000488 ..... N92-12329 #
DE90-008013 ..... N92-12555 #
DE90-008022 ..... N92-12098 #
DE90-008346 ..... N92-12339 #
DE90-008347 ..... N92-12340 #
DE90-008579 ..... N92-12192 #
DE90-008738 ..... N92-12160 #
DE90-008916 ..... N92-12740 #
DE90-009025 ..... N92-12196 #
DE90-009322 ..... N92-12072 #
DE90-009415 ..... N92-12741 #
DE90-009425 ..... N92-12168 #
DE90-009815 ..... N92-12606 #
DE90-010395 ..... N92-12161 #
DE90-010585 ..... N92-12193 #
DE90-010612 ..... N92-12347 #
DE90-010652 ..... N92-12767 #
DE90-010824 ..... N92-12264 #
DE90-010862 ..... N92-12434 #
DE90-010911 ..... N92-12704 #
DE90-011266 ..... N92-12133 #
DE90-011269 ..... N92-12327 #
DE90-011276 ..... N92-12690 #
DE90-011277 ..... N92-12075 #
DE90-011278 ..... N92-12318 #
DE90-011324 ..... N92-12073 #
DE90-011434 ..... N92-12691 #
DE90-011500 ..... N92-12229 #
DE90-011504 ..... N92-12230 #
DE90-011507 ..... N92-12324 #
DE90-011584 ..... N92-12742 #
DE90-011585 ..... N92-12744 #
DE90-011642 ..... N92-12265 #
DE90-011702 ..... N92-12610 #
DE90-011713 ..... N92-12036 #
DE90-011777 ..... N92-12367 #
DE90-011788 ..... N92-12244 #
DE90-011799 ..... N92-12673 #
DE90-011801 ..... N92-12227 #
DE90-012012 ..... N92-12661 #
DE90-012038 ..... N92-12245 #
DE90-012040 ..... N92-12134 #
DE90-012047 ..... N92-12443 #
DE90-012050 ..... N92-12162 #
DE90-012063 ..... N92-12076 #
DE90-012075 ..... N92-12095 #
DE90-012109 ..... N92-12341 #
DE90-012136 ..... N92-12325 #
DE90-012163 ..... N92-12326 #
DE90-012183 ..... N92-12266 #
DE90-012186 ..... N92-12267 #
DE90-012203 ..... N92-12194 #
DE90-012213 ..... N92-12688 #
DE90-012223 ..... N92-12119 #
DE90-012226 ..... N92-12074 #
DE90-012284 ..... N92-12328 #
DE90-012286 ..... N92-12658 #
DE90-012298 ..... N92-12268 #
DE90-012423 ..... N92-12195 #
DE90-012504 ..... N92-12008 #
DE90-012546 ..... N92-12402 #
DE90-012547 ..... N92-12403 #
DE90-012599 ..... N92-12342 #
DE90-012630 ..... N92-12689 #
DE90-012639 ..... N92-12743 #
DE90-012688 ..... N92-12745 #
DE90-012720 ..... N92-12692 #
DE90-012722 ..... N92-12096 #
DE90-012723 ..... N92-12097 #
DE90-012743 ..... N92-12656 #
DE90-012761 ..... N92-12135 #
DE90-012865 ..... N92-12693 #
DE90-012867 ..... N92-12699 #
DE90-012892 ..... N92-12343 #
DE90-012894 ..... N92-12671 #
DE90-012915 ..... N92-12747 #
DE90-012925 ..... N92-12055 #
DE90-012935 ..... N92-12700 #
DE90-012965 ..... N92-12657 #
DE90-013050 ..... N92-12247 #
DE90-013062 ..... N92-12163 #
DE90-013063 ..... N92-12167 #
DE90-013066 ..... N92-12694 #
DE90-013067 ..... N92-12695 #
DE90-013068 ..... N92-12696 #
DE90-013076 ..... N92-12164 #
DE90-013077 ..... N92-12165 #
DE90-013088 ..... N92-12701 #
DE90-013102 ..... N92-12248 #
DE90-013150 ..... N92-12605 #
DE90-013156 ..... N92-12166 #
DE90-013161 ..... N92-12169 #
DE90-013163 ..... N92-12249 #
DE90-013171 ..... N92-12748 #
DE90-013187 ..... N92-12077 #
DE90-013199 ..... N92-12136 #
DE90-013290 ..... N92-12172 #
DE90-013321 ..... N92-12659 #
DE90-013323 ..... N92-12660 #
DE90-013326 ..... N92-12444 #
DE90-013327 ..... N92-12435 #
DE90-013365 ..... N92-12749 #
DE90-013392 ..... N92-12349 #
DE90-013401 ..... N92-12702 #
DE90-013403 ..... N92-12228 #
DE90-013435 ..... N92-12603 #
DE90-013443 ..... N92-12604 #
DE90-013470 ..... N92-12358 #
DE90-013476 ..... N92-12038 #
DE90-013482 ..... N92-12703 #
DE90-013483 ..... N92-12672 #
DE90-013485 ..... N92-12674 #
DE90-013516 ..... N92-12150 #
DE90-013521 ..... N92-12516 #
DE90-013552 ..... N92-12344 #

DE90-013568 ..... N92-12607 #
DE90-013571 ..... N92-12662 #
DE90-013602 ..... N92-12445 #
DE90-013631 ..... N92-11966 #
DE90-013644 ..... N92-12143 #
DE90-013651 ..... N92-12705 #
DE90-013688 ..... N92-12591 #
DE90-013689 ..... N92-12592 #
DE90-013692 ..... N92-12295 #
DE90-013702 ..... N92-12387 #
DE90-013715 ..... N92-12359 #
DE90-013731 ..... N92-12593 #
DE90-013737 ..... N92-12348 #
DE90-013793 ..... N92-12608 #
DE90-013811 ..... N92-12330 #
DE90-013832 ..... N92-12100 #
DE90-013873 ..... N92-12170 #
DE90-013895 ..... N92-12171 #
DE90-013896 ..... N92-12120 #
DE90-013929 ..... N92-12368 #
DE90-013949 ..... N92-12609 #
DE90-013958 ..... N92-12446 #
DE90-014087 ..... N92-12611 #
DE90-014164 ..... N92-12078 #
DE90-014177 ..... N92-12750 #
DE90-014335 ..... N92-12198 #
DE90-014344 ..... N92-12369 #
DE90-014345 ..... N92-12370 #
DE90-014699 ..... N92-12350 #
DE90-014711 ..... N92-12706 #
DE90-503033 ..... N92-12099 #
DE90-503438 ..... N92-12197 #
DE90-503494 ..... N92-12987 #
DE90-503795 ..... N92-12345 #
DE90-505577 ..... N92-12346 #
DE90-625397 ..... N92-12246 #
DE90-625399 ..... N92-12746 #
DE90-625514 ..... N92-12697 #
DE90-625560 ..... N92-12698 #
DE91-002168 ..... N92-12334 #
DE91-002177 ..... N92-12333 #
DE91-002199 ..... N92-12037 #
DE91-002250 ..... N92-12769 #
DE91-011400 ..... N92-12512 #
DE91-011403 ..... N92-12314 #
DE91-013473 ..... N92-12047 #
DE91-013475 ..... N92-12040 #
DE91-013476 ..... N92-12039 #
DE91-014212 ..... N92-12088 #
DE91-015002 ..... N92-12335 #
DE91-016040 ..... N92-12293 #
DE91-016219 ..... N92-12089 #
DE91-016283 ..... N92-12722 #
DE91-016900 ..... N92-12381 #
DE91-016945 ..... N92-12220 #
DE91-017158 ..... N92-12109 #
DE91-017370 ..... N92-12558 #
DE91-017672 ..... N92-12275 #
DE91-017680 ..... N92-12209 #
DE91-017723 ..... N92-12221 #
DE91-017756 ..... N92-12110 #
DE91-017833 ..... N92-12084 #
DE91-017875 ..... N92-12090 #
DE91-017923 ..... N92-12148 #
DE91-017949 ..... N92-12782 #
DE91-017973 ..... N92-12280 #
DE91-017981 ..... N92-12111 #
DE91-017999 ..... N92-12683 #
DE91-018084 ..... N92-12091 #
DE91-018166 ..... N92-12130 #
DE91-018168 ..... N92-12092 #
DE91-018219 ..... N92-12633 #
DE91-018231 ..... N92-12112 #
DE91-018354 ..... N92-12281 #
DE91-018373 ..... N92-12159 #
DE91-018403 ..... N92-12093 #
DE91-018418 ..... N92-12612 #
DE91-018549 ..... N92-12756 #
DE91-018582 ..... N92-12243 #
DE91-018606 ..... N92-12353 #
DE91-018607 ..... N92-12354 #
DE91-018608 ..... N92-12355 #
DE91-018679 ..... N92-12189 #
DE91-018692 ..... N92-12440* #
DE91-018703 ..... N92-12222 #
DE91-018794 ..... N92-12757 #
DE91-018797 ..... N92-12190 #
DE91-018802 ..... N92-12223 #
DE91-018815 ..... N92-12257 #
DE91-018851 ..... N92-12315 #
DE91-018858 ..... N92-12758 #
DE91-018860 ..... N92-12774 #
DE91-018868 ..... N92-12070 #
DE91-018889 ..... N92-12191 #
DE91-018894 ..... N92-12336 #
DE91-018991 ..... N92-12666 #
DE91-018997 ..... N92-12684 #
DE91-018999 ..... N92-12113 #
DE91-019001 ..... N92-12258 #
DE91-019019 ..... N92-12441 #
DE91-019057 ..... N92-12137 #
DE91-019059 ..... N92-12685 #
DE91-019061 ..... N92-12759 #
DE91-019062 ..... N92-12602 #
DE91-019064 ..... N92-12294 #
DE91-019071 ..... N92-12323 #
DE91-527080 ..... N92-12331 #
DE91-628421 ..... N92-12723 #
DE91-628422 ..... N92-12724 #
DE91-628641 ..... N92-12760 #
DE91-628642 ..... N92-12761 #
DE91-628643 ..... N92-12762 #
DE91-628873 ..... N92-12094 #
DE91-629474 ..... N92-12114 #
DE91-630700 ..... N92-12634 #
DE91-630701 ..... N92-12725 #
DE91-631104 ..... N92-12635 #
DE91-631513 ..... N92-12282 #
DE91-631523 ..... N92-12115 #
DE91-631668 ..... N92-12985 #
DE91-634156 ..... N92-12614 #
DE91-634595 ..... N92-12663 #
DE91-634904 ..... N92-12104 #
DE91-638734 ..... N92-12423 #
DE92-000022 ..... N92-12615 #
DE92-000031 ..... N92-12337 #
DE92-000039 ..... N92-12338 #
DE92-000043 ..... N92-12131 #
DE92-000044 ..... N92-12356 #
DE92-000048 ..... N92-12726 #
DE92-000073 ..... N92-12053 #
DE92-000080 ..... N92-12686 #
DE92-000081 ..... N92-12664 #
DE92-000093 ..... N92-12710 #
DE92-000099 ..... N92-12116 #
DE92-000123 ..... N92-12975 #
DE92-000130 ..... N92-12596 #
DE92-000132 ..... N92-12409 #
DE92-000135 ..... N92-12636 #
DE92-000139 ..... N92-12727 #
DE92-000143 ..... N92-12054 #
DE92-000150 ..... N92-12492 #
DE92-000155 ..... N92-12637 #
DE92-000161 ..... N92-12728 #
DE92-000164 ..... N92-12729 #
DE92-000168 ..... N92-12638 #
DE92-000169 ..... N92-12224 #
DE92-000170 ..... N92-12730 #
DE92-000171 ..... N92-12259 #
DE92-000173 ..... N92-12260 #
DE92-000175 ..... N92-12667 #
DE92-000178 ..... N92-12261 #
DE92-000179 ..... N92-12262 #
DE92-000183 ..... N92-12639 #
DE92-000187 ..... N92-12770 #
DE92-000190 ..... N92-12046* #
DE92-000193 ..... N92-12117 #
DE92-000196 ..... N92-12640 #
DE92-000197 ..... N92-12357 #
DE92-000198 ..... N92-12771 #
DE92-000199 ..... N92-12731 #
DE92-000207 ..... N92-12263 #
DE92-000212 ..... N92-12641 #
DE92-000219 ..... N92-12642 #
DE92-000220 ..... N92-12578 #
DE92-000222 ..... N92-12788 #
DE92-000223 ..... N92-12442 #
DE92-000225 ..... N92-12132 #
DE92-000236 ..... N92-12643 #
DE92-000245 ..... N92-12513 #
DE92-000246 ..... N92-12514 #
DE92-000249 ..... N92-12763 #
DE92-000253 ..... N92-12644 #
DE92-000254 ..... N92-12515 #
DE92-000256 ..... N92-12645 #
DE92-000259 ..... N92-12646 #
DE92-000262 ..... N92-12732 #
DE92-000269 ..... N92-12647 #
DE92-000281 ..... N92-12071 #
DE92-000288 ..... N92-12733 #
DE92-000290 ..... N92-12648 #
DE92-000305 ..... N92-12493 #
DE92-000306 ..... N92-12649 #
DE92-000308 ..... N92-12225 #
DE92-000314 ..... N92-12764 #
DE92-000332 ..... N92-12138 #
DE92-000355 ..... N92-12410 #
DE92-000370 ..... N92-12668 #
DE92-000383 ..... N92-12411 #
DE92-000385 ..... N92-12365 #
DE92-000386 ..... N92-12579 #
DE92-000390 ..... N92-12734 #
DE92-000396 ..... N92-12735 #
DE92-000420 ..... N92-12226 #
DE92-000421 ..... N92-12494 #
DE92-000423 ..... N92-12765 #
DE92-000426 ..... N92-12736 #
DE92-000428 ..... N92-12283 #
DE92-000431 ..... N92-12737 #
DE92-000432 ..... N92-12118 #
DE92-000439 ..... N92-12650 #
DE92-000447 ..... N92-12766 #
DE92-000448 ..... N92-12986 #
DE92-000449 ..... N92-12580 #
DE92-000470 ..... N92-12651 #
DE92-000472 ..... N92-12652 #
DE92-000476 ..... N92-12687 #
DE92-000491 ..... N92-12738 #
DE92-000518 ..... N92-12401 #
DE92-000532 ..... N92-12653 #
DE92-000533 ..... N92-12654 #
DE92-000638 ..... N92-12655 #
DE92-000649 ..... N92-12669 #
DE92-000650 ..... N92-12495 #
DE92-000651 ..... N92-12785 #
DE92-000656 ..... N92-12670 #
DE92-000667 ..... N92-12424 #
DE92-000672 ..... N92-12739 #
DE92-000674 ..... N92-12284 #
DE92-703044 ..... N92-12417 #

DIGEL-1991-1 ..... N92-12178 #

DLR-FB-90-46 ..... N92-12005 #
DLR-FB-91-09 ..... N92-12005 #

DOE/CE-76246/T5 ..... N92-12402 #
DOE/CE-76246/T6 ..... N92-12403 #

DOE/CH-10093/100/1991 ..... N92-12333 #
DOE/CH-10093/113 ..... N92-12334 #

DOE/CS-66001-14 ..... N92-12392* #

DOE/DP-10779/T1 ..... N92-12691 #

DOE/ER-0455P ..... N92-12327 #
DOE/ER-0459T ..... N92-12367 #
DOE/ER-0461P ..... N92-12244 #
DOE/ER-0511P ..... N92-12401 #
DOE/ER-03130/53 ..... N92-12444 #
DOE/ER-03130/54 ..... N92-12435 #
DOE/ER-03130/55 ..... N92-12659 #
DOE/ER-03130/269 ..... N92-12660 #
DOE/ER-03230/T9 ..... N92-12604 #
DOE/ER-13432/6 ..... N92-12073 #
DOE/ER-13820/1 ..... N92-12223 #
DOE/ER-14079/10 ..... N92-12558 #
DOE/ER-25048/2 ..... N92-12446 #
DOE/ER-40233/5 ..... N92-12603 #
DOE/ER-40272/103 ..... N92-12359 #
DOE/ER-40316/5 ..... N92-12653 #
DOE/ER-40335/6 ..... N92-12615 #
DOE/ER-40406/4 ..... N92-12654 #
DOE/ER-40425/249 ..... N92-12609 #
DOE/ER-40613/1 ..... N92-12664 #
DOE/ER-45326/3 ..... N92-12745 #
DOE/ER-53198/159 ..... N92-12706 #
DOE/ER-53198/180 ..... N92-12728 #
DOE/ER-53198/182 ..... N92-12729 #
DOE/ER-53223/130 ..... N92-12693 #
DOE/ER-60253/8 ..... N92-12387 #
DOE/ER-61058/1 ..... N92-12686 #
DOE/ER-61060/1 ..... N92-12159 #

DOE/ET-10815/147 ..... N92-12689 #
DOE/ET-53088/338 ..... N92-12198 #
DOE/ET-53088/507 ..... N92-12612 #

DOE/ID-12735/T18 ..... N92-12735 #

DOE/MC-24207/2826 ..... N92-12329 #

DOE/NE-32134/T2 ..... N92-12008 #

DOE/PC-88949/T5 ..... N92-12196 #
DOE/PC-89775/5 ..... N92-12091 #
DOE/PC-90305/T3 ..... N92-12138 #

DOE/RL-01830T-H11 ..... N92-12353 #
DOE/RL-01830T-H12 ..... N92-12354 #
DOE/RL-01830T-H13 ..... N92-12355 #

DREP-TM-88-25-PT-1 ..... N92-12060 #

DTRC/SME-91/31 ..... N92-12057 #

E-6007 ..... N92-12786* #

E-6597 N92-12151* #
E-6621 N92-12212* #
E-6642 N92-11995* #
E-6668 N92-12316* #

ECFA-90-133(V-2)-VOL-2 N92-12663 #

EGG-EE-9479 N92-12440* #

EGG-M-89264 N92-12657 #
EGG-M-90237 N92-12701 #

EGG-10617-7002 N92-12358 #

EPA/600/D-91/122 N92-12351 #

ESA-BR-74 N92-12009 #

ESD-PUBL-3397 N92-12318 #

ESDU-AERO-A.S.01.03.01 N92-11968

ESDU-76004 N92-12081
ESDU-76006 N92-12081
ESDU-91004 N92-11967
ESDU-91005 N92-12080
ESDU-91006 N92-12081
ESDU-91007 N92-11968
ESDU-91009 N92-11969
ESDU-91011 N92-12208
ESDU-91012-PT-1 N92-12301
ESDU-91014 N92-11970
ESDU-91015 N92-12102
ESDU-91022 N92-12082

ESM-27 N92-12614 #

ETDE/JP-MF-2703044 N92-12417 #

ETN-91-90010 N92-12374
ETN-91-90041 N92-12005 #
ETN-91-90047 N92-12178 #
ETN-91-90048 N92-12665 #
ETN-91-90076 N92-11971 #
ETN-91-90077 N92-12210 #
ETN-91-90078 N92-12211 #
ETN-91-90087 N92-11972 #
ETN-91-90088 N92-12508 #
ETN-91-90098 N92-12086 #
ETN-91-90099 N92-12419 #
ETN-91-90100 N92-11978 #
ETN-91-90101 N92-11979 #
ETN-91-90102 N92-11980 #
ETN-91-90103 N92-12361 #
ETN-91-90105 N92-12414 #
ETN-91-90106 N92-11981 #
ETN-91-90107 N92-12215 #
ETN-91-90108 N92-12216 #
ETN-91-90109 N92-11982 #
ETN-91-90110 N92-12006 #
ETN-91-90111 N92-12235 #
ETN-91-90112 N92-12308 #
ETN-91-90113 N92-12420 #
ETN-91-90117 N92-12473 #
ETN-91-90118 N92-12405 #
ETN-91-90119 N92-12406 #
ETN-91-90120 N92-12474 #
ETN-91-90121 N92-12613 #
ETN-91-90122 N92-12152 #
ETN-91-90123 N92-12236 #
ETN-91-90124 N92-12237 #
ETN-91-90125 N92-12238 #
ETN-91-90126 N92-12753 #
ETN-91-90127 N92-12179 #
ETN-91-90128 N92-12175 #
ETN-91-90129 N92-12176 #
ETN-91-90130 N92-12303 #
ETN-91-90135 N92-12709 #
ETN-91-90136 N92-11973 #
ETN-91-90137 N92-12103 #
ETN-91-90138 N92-12413 #
ETN-91-90139 N92-12122 #
ETN-91-90140 N92-12304 #
ETN-91-90141 N92-12772 #
ETN-91-90142 N92-12545 #
ETN-91-90154 N92-12754 #
ETN-91-90155 N92-12155 #
ETN-91-90156 N92-12560 #
ETN-91-90157 N92-12561 #
ETN-91-90158 N92-12180 #
ETN-91-90159 N92-12181 #
ETN-91-90161 N92-12391 #
ETN-91-90164 N92-12509 #
ETN-91-90165 N92-12182 #
ETN-91-90166 N92-12407 #
ETN-91-90167 N92-12183 #
ETN-91-90168 N92-12478 #
ETN-91-90169 N92-12156 #
ETN-91-90170 N92-12713 #
ETN-91-90171 N92-12616 #
ETN-91-90172 N92-12714 #
ETN-91-90173 N92-12680 #
ETN-91-90174 N92-12617 #
ETN-91-90175 N92-12618 #
ETN-91-90176 N92-12184 #
ETN-91-90177 N92-12253 #
ETN-91-90180 N92-12619 #
ETN-91-90182 N92-12594 #
ETN-91-90183 N92-12562 #
ETN-91-90184 N92-12129 #
ETN-91-90185 N92-12217 #
ETN-91-90186 N92-12218 #
ETN-91-90187 N92-12219 #
ETN-91-90188 N92-12108 #
ETN-91-90189 N92-12043 #
ETN-91-90190 N92-12044 #
ETN-91-90191 N92-12034 #
ETN-91-90192 N92-12588 #
ETN-91-90193 N92-12589 #
ETN-91-90194 N92-12003 #
ETN-91-90196 N92-12421 #
ETN-91-90197 N92-12422 #
ETN-91-90198 N92-12590 #
ETN-91-90207 N92-12277 #
ETN-91-90210 N92-12581 #
ETN-91-90211 N92-12582 #
ETN-91-90212 N92-12583 #
ETN-91-90213 N92-12584 #
ETN-91-90214 N92-12548 #
ETN-91-90215 N92-12563 #
ETN-91-90216 N92-12479 #
ETN-91-90217 N92-12480 #
ETN-91-90218 N92-12186 #
ETN-91-90219 N92-12483 #
ETN-91-90220 N92-12510 #
ETN-91-90221 N92-12484 #
ETN-91-90222 N92-12485 #
ETN-91-90223 N92-12408 #
ETN-91-90224 N92-12486 #
ETN-91-90225 N92-12564 #
ETN-91-90226 N92-12565 #
ETN-91-90227 N92-12566 #
ETN-91-90228 N92-12567 #
ETN-91-90229 N92-12568 #
ETN-91-90230 N92-12569 #
ETN-91-90231 N92-12487 #
ETN-91-90232 N92-12570 #
ETN-91-90234 N92-12768
ETN-91-90235 N92-12571
ETN-91-90236 N92-12572
ETN-91-90237 N92-12573
ETN-91-90238 N92-12586
ETN-91-90239 N92-12574
ETN-91-90240 N92-12575
ETN-91-90241 N92-12511
ETN-91-90242 N92-12550
ETN-91-90243 N92-12187
ETN-91-90244 N92-12188
ETN-91-90245 N92-12551
ETN-91-90248 N92-12552
ETN-91-90249 N92-12488
ETN-91-90250 N92-12553
ETN-91-90251 N92-12787
ETN-91-90252 N92-12775
ETN-91-90253 N92-12776
ETN-91-90254 N92-12777
ETN-91-90255 N92-12363 #
ETN-91-90256 N92-12310 #
ETN-91-90257 N92-12254 #
ETN-91-90258 N92-12157 #
ETN-91-90259 N92-12386 #
ETN-91-90260 N92-12576 #
ETN-91-90261 N92-12009 #
ETN-91-90262 N92-12064 #
ETN-91-90264 N92-12145 #
ETN-91-90265 N92-12146 #
ETN-91-90266 N92-12755 #
ETN-91-90267 N92-12065 #
ETN-91-90268 N92-12066 #
ETN-91-90269 N92-12067 #
ETN-91-90270 N92-12240 #
ETN-91-90271 N92-12255 #
ETN-91-90272 N92-12256 #
ETN-91-90273 N92-12322 #
ETN-91-90274 N92-12778 #
ETN-91-90275 N92-12681 #
ETN-91-90276 N92-12311 #
ETN-91-90277 N92-12068 #
ETN-91-90278 N92-12489 #
ETN-91-90279 N92-12393 #
ETN-91-90280 N92-12399 #
ETN-91-90281 N92-12400 #
ETN-91-90282 N92-12773 #
ETN-91-90283 N92-12147 #
ETN-91-90284 N92-12599 #
ETN-91-90285 N92-12600 #
ETN-91-90286 N92-12312 #
ETN-91-90287 N92-11993 #
ETN-91-90288 N92-12313 #
ETN-91-90289 N92-12601 #
ETN-91-90290 N92-12554 #
ETN-91-90291 N92-12491 #
ETN-91-90292 N92-12577 #
ETN-91-90294 N92-12004 #
ETN-91-90295 N92-12158
ETN-91-90296 N92-12241
ETN-91-90297 N92-12682
ETN-91-90298 N92-12087
ETN-91-90299 N92-12620 #
ETN-91-90302 N92-12595 #
ETN-91-90305 N92-12378 #
ETN-91-90307 N92-12621 #
ETN-91-90308 N92-12715 #
ETN-91-90309 N92-12628 #
ETN-91-90312 N92-12974
ETN-91-90313 N92-12242*
ETN-91-90314 N92-12364
ETN-91-90315 N92-12982
ETN-91-90316 N92-12984
ETN-91-99630 N92-12585 #

FASAC-TAR-90010911 N92-12704 #

FFA-TN-1990-43 N92-12599 #
FFA-TN-1990-46 N92-12600 #
FFA-TN-1991-18 N92-12312 #
FFA-TN-1991-22 N92-11993 #
FFA-TN-1991-24 N92-12313 #
FFA-TN-1991-30 N92-12601 #

FFI-90/4006 N92-12363 #
FFI-91/4005 N92-12310 #
FFI-91/7006 N92-12254 #
FFI-91/7007-VOL-3 N92-12157 #
FFI-91/7009 N92-12386 #
FFI-91/7011 N92-12576 #

FNAL-TM-1666 N92-12443 #

FNAL/C-91/225 N92-12651 #
FNAL/C-91/227 N92-12637 #
FNAL/C-91/234-E N92-12655 #
FNAL/C-91/241 N92-12652 #

FOA-B-40392-4.4 N92-12393 #

FOA-C-40261-4.5 N92-12399 #
FOA-C-40282-4.3 N92-12400 #
FOA-C-40285-4.3 N92-12773 #
FOA-C-40286-4.5 N92-12147 #

FSC-ESD-217-88-435 N92-12144* #

GA-A-20614 N92-12732 #
GA-A-20624 N92-12733 #

H-1766 N92-11994* #

IAE-0070 N92-12985 #

IAR-AN-69 N92-12213 #
IAR-AN-70-PHASE-1 N92-11988 #

IAR-66 N92-12142 #

IC-AERO-90-01 N92-12620 #

ICASE-91-71 N92-12556* #
ICASE-91-78 N92-12557* #

ICOMP-91-21 N92-12316* #

IFSR-338 N92-12198 #
IFSR-507 N92-12612 #

ILR-MITT-261(1991) N92-12277 #

INSRP-90-01-VOL-1 N92-12047 #
INSRP-90-01-VOL-2 N92-12040 #
INSRP-90-07-VOL-1 N92-12039 #

IS-T-1412 N92-12092 #
IS-T-1572 N92-12130 #

ISBN-0-309-04334-4 N92-12933* #
ISBN-0-85679-766-9 N92-11967
ISBN-0-85679-767-7 N92-12080
ISBN-0-85679-768-5 N92-12081

ISBN-0-85679-769-3 N92-11968
ISBN-0-85679-771-5 N92-11969
ISBN-0-85679-773-1 N92-12208
ISBN-0-85679-774-X N92-12301
ISBN-0-85679-776-6 N92-11970
ISBN-0-85679-777-4 N92-12102
ISBN-0-85679-784-7 N92-12082
ISBN-90-386-0041-0 N92-12304 #
ISBN-90-6757-045-1 N92-12772 #
ISBN-90-9003969-4 N92-12175 #
ISBN-90-9004212-1 N92-12176 #
ISBN-91-7174-574-2 N92-12393 #
ISBN-92-835-0628-6 N92-12517 #
ISBN-92-835-0629-4 N92-12449 #
ISBN-92-9092-075-0 N92-12009 #

ISSN-0038-0911 N92-12980 #
ISSN-0038-0911 N92-12981 #
ISSN-0082-5247 N92-11974 #
ISSN-0082-5255 N92-11996 #
ISSN-0082-5255 N92-12042 #
ISSN-0082-5255 N92-12373 #
ISSN-0141-397X N92-11967
ISSN-0141-397X N92-11969
ISSN-0141-397X N92-11970
ISSN-0141-402X N92-12208
ISSN-0141-497X N92-11968
ISSN-0141-3961 N92-12301
ISSN-0141-4062 N92-12080
ISSN-0141-4062 N92-12081
ISSN-0141-4062 N92-12082
ISSN-0141-4070 N92-12082
ISSN-0143-7305 N92-12158
ISSN-0143-7305 N92-12241
ISSN-0143-7305 N92-12682
ISSN-0171-1342 N92-12005 #
ISSN-0250-1589 N92-12009 #
ISSN-0308-7247 N92-12620 #
ISSN-0347-2124 N92-12147 #
ISSN-0347-2124 N92-12399 #
ISSN-0347-2124 N92-12400 #
ISSN-0347-2124 N92-12773 #
ISSN-0706-568X N92-12177 #
ISSN-0751-1337 N92-12405 #
ISSN-0751-1337 N92-12473 #
ISSN-0751-1353 N92-12152 #
ISSN-0751-1353 N92-12406 #
ISSN-0751-1353 N92-12474 #
ISSN-0751-1353 N92-12489 #
ISSN-0751-1353 N92-12613 #
ISSN-0800-4412 N92-12675 #
ISSN-0802-2437 N92-12157 #
ISSN-0802-2437 N92-12254 #
ISSN-0802-2437 N92-12310 #
ISSN-0802-2437 N92-12363 #
ISSN-0802-2437 N92-12386 #
ISSN-0802-2437 N92-12576 #
ISSN-0915-633X N92-12707 #
ISSN-0915-633X N92-12708 #
ISSN-0958-0387 N92-12102
ISSN-0959-2423 N92-12087

JPL-PUBL-83-39-REV-4 N92-12481* #
JPL-PUBL-87-4-VOL-13 N92-12035* #
JPL-PUBL-90-37 N92-12278* #
JPL-PUBL-90-49-REV-1 N92-12784* #
JPL-PUBL-91-4 N92-12392* #
JPL-PUBL-91-6 N92-12549* #
JPL-PUBL-91-7 N92-12482* #
JPL-PUBL-91-8 N92-12385* #
JPL-PUBL-91-9 N92-12384* #
JPL-PUBL-91-26 N92-12292* #
JPL-PUBL-91-36 N92-12332* #

JRC-90-01 N92-12448* #

KNMI-176 N92-12374

KSC-DM-3538 N92-12300* #

KTM/E-D-194 N92-12331 #

LA-UR-90-1013 N92-12740 #
LA-UR-90-1285 N92-12193 #
LA-UR-90-1386 N92-12347 #
LA-UR-90-1762 N92-12076 #
LA-UR-90-1945 N92-12077 #
LA-UR-90-2021 N92-12748 #
LA-UR-90-2043 N92-12295 #
LA-UR-90-2075 N92-12249 #
LA-UR-90-2092 N92-12169 #
LA-UR-90-2135 N92-12166 #
LA-UR-90-2166 N92-12605 #
LA-UR-90-2170 N92-12247 #
LA-UR-91-1068 N92-12512 #
LA-UR-91-1292 N92-12314 #
LA-UR-91-2284 N92-12293 #
LA-UR-91-2862 N92-12764 #
LA-UR-91-2876 N92-12225 #
LA-UR-91-2882 N92-12649 #
LA-UR-91-2887 N92-12493 #
LA-UR-91-2891 N92-12646 #
LA-UR-91-2922 N92-12645 #
LA-UR-91-2923 N92-12515 #
LA-UR-91-2924 N92-12442 #
LA-UR-91-2926 N92-12644 #
LA-UR-91-2951 N92-12763 #
LA-UR-91-2965 N92-12578 #
LA-UR-91-2968 N92-12642 #
LA-UR-91-2988 N92-12641 #
LA-UR-91-3013 N92-12263 #
LA-UR-91-3019 N92-12731 #
LA-UR-91-3023 N92-12771 #
LA-UR-91-3028 N92-12357 #
LA-UR-91-3029 N92-12640 #
LA-UR-91-3051 N92-12117 #
LA-UR-91-3052 N92-12046* #
LA-UR-91-3063 N92-12770 #
LA-UR-91-3081 N92-12639 #
LA-UR-91-3091 N92-12262 #
LA-UR-91-3092 N92-12261 #
LA-UR-91-3102 N92-12667 #
LA-UR-91-3112 N92-12260 #
LA-UR-91-3115 N92-12259 #
LA-UR-91-3130 N92-12730 #
LA-UR-91-3135 N92-12224 #
LA-UR-91-3136 N92-12638 #

LA-11789-MS N92-12133 #

LAAS-91134 N92-12236 #
LAAS-91154 N92-12237 #
LAAS-91178 N92-12238 #
LAAS-91187 N92-12753 #
LAAS-91711 N92-12179 #

LAMP-89/2 N92-12246 #

LAO-2732-1856 N92-12358 #

LBL-27440 N92-12195 #
LBL-28618-3/3 N92-12330 #
LBL-28749 N92-12742 #
LBL-28750 N92-12744 #
LBL-28972 N92-12750 #
LBL-28994 N92-12608 #
LBL-29112 N92-12078 #
LBL-29576 N92-12785 #
LBL-30574 N92-12424 #
LBL-30668 N92-12670 #
LBL-30695 N92-12495 #
LBL-30766 N92-12669 #

LC-79-640375 N92-12980 #
LC-79-640375 N92-12981 #
LC-90-62813 N92-12933* #

LESC-29239 N92-12416* #

LINO-1991-2 N92-12665 #

LPI-CONTRIB-766 N92-12901* #

M-670 N92-12052* #

MATHS-REPT-A-147 N92-12554 #
MATHS-REPT-A-148 N92-12491 #
MATHS-REPT-A-150 N92-12577 #

MBB-UD-0586-90-PUB N92-12003 #
MBB-UD-0594-91-PUB N92-12421 #
MBB-UD-0595-91-PUB N92-12422 #
MBB-UD-0596-91-PUB N92-12590 #

MBB-UO-0075-91-PUB N92-12043 #
MBB-UO-0152-91-PUB N92-12044 #
MBB-UO-0153-91-PUB N92-12034 #
MBB-UO-0154-91-PUB N92-12588 #
MBB-UO-0155-91-PUB N92-12589 #

MBB-Z-0360-91-PUB N92-12108 #

MPE-PREPRINT-200 N92-12974
MPE-PREPRINT-201 N92-12242*
MPE-PREPRINT-202 N92-12364
MPE-PREPRINT-203 N92-12982
MPE-PREPRINT-204 N92-12984

NAE-MISC-63 N92-11991 #

NAS 1.15:4322 N92-12286* #
NAS 1.15:4329 N92-12792* #
NAS 1.15:100741 N92-12321* #
NAS 1.15:103556 N92-12375* #
NAS 1.15:103753 N92-12786* #
NAS 1.15:103824 N92-12300* #
NAS 1.15:104117 N92-12045* #
NAS 1.15:104126 N92-12309* #
NAS 1.15:104134 N92-12598* #
NAS 1.15:104142 N92-11977* #
NAS 1.15:104145 N92-11985* #
NAS 1.15:104161 N92-12007* #
NAS 1.15:104241 N92-11994* #
NAS 1.15:104540 N92-12185* #
NAS 1.15:105105 N92-12388* #
NAS 1.15:105124 N92-11984* #
NAS 1.15:105274 N92-12151* #
NAS 1.15:105299 N92-11995* #
NAS 1.15:105315 N92-12316* #
NAS 1.15:105449 N92-12046* #
NAS 1.15:893240 N92-12173* #
NAS 1.21:7011(354) N92-12404*
NAS 1.21:7011(355) N92-12412*
NAS 1.26:184203 N92-12447* #
NAS 1.26:184213 N92-12139* #
NAS 1.26:184215 N92-12231* #
NAS 1.26:184221 N92-12448* #
NAS 1.26:184229 N92-12360* #
NAS 1.26:184234 N92-12269* #
NAS 1.26:184239 N92-12273* #
NAS 1.26:184255 N92-12362* #
NAS 1.26:184257 N92-12239* #
NAS 1.26:184259 N92-12279* #
NAS 1.26:185495 N92-12242*
NAS 1.26:185662 N92-12416* #
NAS 1.26:186558 N92-12933* #
NAS 1.26:187199 N92-12307* #
NAS 1.26:187226 N92-12063* #
NAS 1.26:187417 N92-12207* #
NAS 1.26:187623 N92-12002* #
NAS 1.26:187628 N92-12556* #
NAS 1.26:187893 N92-12437* #
NAS 1.26:188124 N92-12497* #
NAS 1.26:188126 N92-12440* #
NAS 1.26:188816 N92-12496* #
NAS 1.26:188848 N92-12436* #
NAS 1.26:188856 N92-12033* #
NAS 1.26:188915 N92-12319* #
NAS 1.26:188934 N92-12901* #
NAS 1.26:188947 N92-12781* #
NAS 1.26:188950 N92-12439* #
NAS 1.26:188968 N92-12332* #
NAS 1.26:188970 N92-12389* #
NAS 1.26:188972 N92-12390* #
NAS 1.26:188974 N92-12141* #
NAS 1.26:188993 N92-12083* #
NAS 1.26:189002 N92-12274* #
NAS 1.26:189023 N92-12276* #
NAS 1.26:189027 N92-12784* #
NAS 1.26:189029 N92-12385* #
NAS 1.26:189030 N92-12035* #
NAS 1.26:189035 N92-12481* #
NAS 1.26:189037 N92-12482* #
NAS 1.26:189038 N92-12278* #
NAS 1.26:189039 N92-12144* #
NAS 1.26:189042 N92-12212* #
NAS 1.26:189046 N92-12557* #
NAS 1.26:189048 N92-12306* #
NAS 1.26:189241 N92-12366* #
NAS 1.26:189248 N92-12149* #
NAS 1.26:189249 N92-12317* #
NAS 1.26:189446 N92-12549* #
NAS 1.26:189447 N92-12384* #
NAS 1.26:189448 N92-12292* #
NAS 1.26:189452 N92-12392* #
NAS 1.26:189455 N92-11992* #
NAS 1.26:189456 N92-11983* #
NAS 1.55:3130 N92-12425* #
NAS 1.55:10081 N92-12010* #
NAS 1.60:3161 N92-12052* #
NAS 1.71:LAR-14168-1 N92-12302* #
NAS 1.71:LAR-14567-1-CU N92-12174* #
NAS 1.71:LAR-14763-1 N92-12121* #
NAS 1.71:MSC-21759-1 N92-12079* #
NAS 1.71:NPO-17998-1-CU N92-12438* #

NASA-CASE-LAR-14168-1 N92-12302* #
NASA-CASE-LAR-14567-1-CU N92-12174* #
NASA-CASE-LAR-14763-1 N92-12121* #

NASA-CASE-MSC-21759-1 N92-12079* #

NASA-CASE-NPO-17998-1-CU N92-12438* #

NASA-CP-3130 N92-12425* #
NASA-CP-10081 N92-12010* #

NASA-CR-184203 N92-12447* #

NASA-CR-184213 ..... N92-12139* #
NASA-CR-184215 ..... N92-12231* #
NASA-CR-184221 ..... N92-12448* #
NASA-CR-184229 ..... N92-12360* #
NASA-CR-184234 ..... N92-12269* #
NASA-CR-184239 ..... N92-12273* #
NASA-CR-184255 ..... N92-12362* #
NASA-CR-184257 ..... N92-12239* #
NASA-CR-184259 ..... N92-12279* #
NASA-CR-185495 ..... N92-12242*
NASA-CR-185662 ..... N92-12416* #
NASA-CR-186558 ..... N92-12933* #
NASA-CR-187199 ..... N92-12307* #
NASA-CR-187226 ..... N92-12063* #
NASA-CR-187417 ..... N92-12207* #
NASA-CR-187623 ..... N92-12002* #
NASA-CR-187628 ..... N92-12556* #
NASA-CR-187893 ..... N92-12437* #
NASA-CR-188124 ..... N92-12497* #
NASA-CR-188126 ..... N92-12440* #
NASA-CR-188816 ..... N92-12496* #
NASA-CR-188848 ..... N92-12436* #
NASA-CR-188856 ..... N92-12033* #
NASA-CR-188915 ..... N92-12319* #
NASA-CR-188934 ..... N92-12901* #
NASA-CR-188947 ..... N92-12781* #
NASA-CR-188950 ..... N92-12439* #
NASA-CR-188968 ..... N92-12332* #
NASA-CR-188970 ..... N92-12389* #
NASA-CR-188972 ..... N92-12390* #
NASA-CR-188974 ..... N92-12141* #
NASA-CR-188993 ..... N92-12083* #
NASA-CR-189002 ..... N92-12274* #
NASA-CR-189023 ..... N92-12276* #
NASA-CR-189027 ..... N92-12784* #
NASA-CR-189029 ..... N92-12385* #
NASA-CR-189030 ..... N92-12035* #
NASA-CR-189035 ..... N92-12481* #
NASA-CR-189037 ..... N92-12482* #
NASA-CR-189038 ..... N92-12278* #
NASA-CR-189039 ..... N92-12144* #
NASA-CR-189042 ..... N92-12212* #
NASA-CR-189046 ..... N92-12557* #
NASA-CR-189048 ..... N92-12306* #
NASA-CR-189241 ..... N92-12366* #
NASA-CR-189248 ..... N92-12149* #
NASA-CR-189249 ..... N92-12317* #
NASA-CR-189446 ..... N92-12549* #
NASA-CR-189447 ..... N92-12384* #
NASA-CR-189448 ..... N92-12292* #
NASA-CR-189452 ..... N92-12392* #
NASA-CR-189455 ..... N92-11992* #
NASA-CR-189456 ..... N92-11983* #

NASA-SP-7011(354) N92-12404*
NASA-SP-7011(355) N92-12412*

NASA-TM-4322 ..... N92-12286* #
NASA-TM-4329 ..... N92-12792* #
NASA-TM-100741 ..... N92-12321* #
NASA-TM-103556 ..... N92-12375* #
NASA-TM-103753 ..... N92-12786* #
NASA-TM-103824 ..... N92-12300* #
NASA-TM-104117 ..... N92-12045* #
NASA-TM-104126 ..... N92-12309* #
NASA-TM-104134 ..... N92-12598* #
NASA-TM-104142 ..... N92-11977* #
NASA-TM-104145 ..... N92-11985* #
NASA-TM-104161 ..... N92-12007* #
NASA-TM-104241 ..... N92-11994* #
NASA-TM-104540 ..... N92-12185* #
NASA-TM-105105 ..... N92-12388* #
NASA-TM-105124 ..... N92-11984* #
NASA-TM-105274 ..... N92-12151* #
NASA-TM-105299 ..... N92-11995* #
NASA-TM-105315 ..... N92-12316* #
NASA-TM-105449 ..... N92-12046* #
NASA-TM-893240 ..... N92-12173* #

NASA-TP-3161 ..... N92-12052* #

NC-ERB-1027 ..... N92-12712 #

NDRE/PUBL-91/1002 ..... N92-12675 #

NEDOJ-P-8902-2-PT-2 ..... N92-12987 #

NFMW-0001 ..... N92-12114 #

NIFS-16 ..... N92-12707 #
NIFS-17 ..... N92-12708 #

NIKHEF-K-AMPS/91-02 ..... N92-12595 #

NIPER-533 ..... N92-12769 #

NLT-TP-89014-U ..... N92-12585 #

NOAA-TR-NESDIS-59 ..... N92-12470 #

NOARL-CR-033-91 ..... N92-12383 #

NPL-DES-102 ..... N92-12158
NPL-DES-104 ..... N92-12241
NPL-DES-111 ..... N92-12682

NPL-DMM(A)-26 ..... N92-12087

NRC-DM-009 ..... N92-12001 #

NRC-ERA-380 ..... N92-12783 #

NRC-ERB-1012 ..... N92-12252 #
NRC-ERB-1023 ..... N92-12475 #
NRC-ERB-1029 ..... N92-12711 #
NRC-ERB-1030 ..... N92-12476 #
NRC-ERB-1031 ..... N92-12547 #

NRC-HSA-434 ..... N92-11976 #

NRC-IAR-C3 ..... N92-11975 #

NRC-IGM88AP-102-742-G-PT-1 ..... N92-12127 #
NRC-IGM88AP-102-777-G ..... N92-12124 #
NRC-IGM88AP-103-654-G ..... N92-12128 #
NRC-IGM88AP-103-773-G ..... N92-12752 #
NRC-IGM88AP-103-778-G ..... N92-12062 #
NRC-IGM88AP-202-712-G ..... N92-12352 #
NRC-IGM88AP-403-793-G ..... N92-12125 #
NRC-IGM88AP-404-792-G ..... N92-12291 #
NRC-IGM88RT-101-686-G-PT-6 ..... N92-12061 #
NRC-IGM88RT-101-772-G ..... N92-12126 #
NRC-IGM88RT-202-715-G ..... N92-12106 #
NRC-IGM90D-401-993-G ..... N92-12751 #

NRC-IMI90AP-11001-1056-G ..... N92-12678 #

NRC-LTR-HA-5X5/0196 ..... N92-11975 #

NRC-LTR-ST-1747 ..... N92-12123 #
NRC-LTR-ST-1765 ..... N92-12058 #
NRC-LTR-ST-1773 ..... N92-12288 #
NRC-LTR-ST-1790 ..... N92-12059 #
NRC-LTR-ST-1791 ..... N92-12305 #
NRC-LTR-ST-1792 ..... N92-11997 #
NRC-LTR-ST-1798 ..... N92-12105 #
NRC-LTR-ST-1799 ..... N92-12289 #
NRC-LTR-ST-1804 ..... N92-11990 #

NRC-LTR-UA-99 ..... N92-12372 #

NRC-TR-ENG-001 ..... N92-12000 #
NRC-TR-ENG-002 ..... N92-12233 #
NRC-TR-ENG-003 ..... N92-11998 #
NRC-TR-ENG-013 ..... N92-11999 #

NRC-TR-GD-012-PT-2 ..... N92-12214 #
NRC-TR-GD-013 ..... N92-12085 #

NRC-TR-SYS-016 ..... N92-12418 #

NRC-28433 ..... N92-12128 #
NRC-28667-PT-6 ..... N92-12061 #
NRC-28710 ..... N92-12418 #
NRC-28893 ..... N92-12352 #
NRC-28896 ..... N92-12106 #
NRC-28903 ..... N92-12290 #
NRC-28906 ..... N92-12107 #
NRC-29077 ..... N92-12234 #
NRC-29078-VOL-3-NO-2 ..... N92-12177 #
NRC-29094-PT-1 ..... N92-12127 #
NRC-29095 ..... N92-12679 #
NRC-29225 ..... N92-12477 #
NRC-29287-PT-2 ..... N92-12214 #
NRC-29449 ..... N92-12126 #
NRC-29450 ..... N92-12752 #
NRC-29455 ..... N92-12124 #
NRC-29456 ..... N92-12062 #
NRC-29717 ..... N92-12291 #
NRC-29718 ..... N92-12125 #
NRC-29799 ..... N92-12252 #
NRC-29808 ..... N92-12000 #
NRC-29810 ..... N92-12085 #
NRC-29847 ..... N92-12233 #
NRC-30165 ..... N92-12001 #
NRC-30241 ..... N92-11998 #
NRC-30297 ..... N92-12559 #
NRC-30465 ..... N92-11991 #
NRC-30824 ..... N92-12712 #
NRC-31210 ..... N92-12475 #
NRC-31370 ..... N92-12751 #
NRC-31510 ..... N92-12711 #

NRC-31578 ..... N92-11999 #
NRC-31743 ..... N92-12546 #
NRC-31757 ..... N92-12476 #
NRC-31759 ..... N92-12783 #
NRC-31761 ..... N92-12154 #
NRC-31764 ..... N92-12153 #
NRC-31776 ..... N92-12547 #
NRC-32135 ..... N92-12213 #
NRC-32136 ..... N92-12142 #
NRC-32137-PHASE-1 ..... N92-11988 #
NRC-32596 ..... N92-12678 #

OCS/MMS-91/0035-VOL-73 ..... N92-12382 #

ONERA-RF-31/3409-PY ..... N92-11972 #
ONERA-RF-37/3479-CY ..... N92-12508 #

ORNL/ATD-20 ..... N92-12096 #

ORNL/CCIP-91/25 ..... N92-12580 #

ORNL/FTR-3624 ..... N92-12688 #
ORNL/FTR-3640 ..... N92-12656 #
ORNL/FTR-3648 ..... N92-12349 #

ORNL/SUB-88-SB775/02 ..... N92-12109 #

ORNL/TM-10914 ..... N92-12350 #
ORNL/TM-11175 ..... N92-12162 #
ORNL/TM-11380 ..... N92-12245 #
ORNL/TM-11448 ..... N92-12134 #
ORNL/TM-11501 ..... N92-12075 #
ORNL/TM-11502 ..... N92-12318 #
ORNL/TM-11781 ..... N92-12734 #
ORNL/TM-11850 ..... N92-12579 #
ORNL/TM-11881 ..... N92-12411 #
ORNL/TM-11893 ..... N92-12071 #
ORNL/TM-11895 ..... N92-12365 #

ORNL/TR-91-13 ..... N92-12221 #
ORNL/TR-91/6 ..... N92-12093 #

OTN-016407 ..... N92-12044 #
OTN-018406 ..... N92-12034 #
OTN-019397 ..... N92-12589 #
OTN-019398 ..... N92-12588 #
OTN-033073 ..... N92-12108 #
OTN-033127 ..... N92-12043 #

PAPER-106 ..... N92-11984* #

PB91-204917 ..... N92-12382 #
PB91-205559 ..... N92-12371 #
PB91-213546 ..... N92-12351 #
PB91-217331 ..... N92-12980 #
PB91-217349 ..... N92-12981 #

PNL-SA-16927 ..... N92-12132 #
PNL-SA-19765 ..... N92-12633 #
PNL-SA-19771 ..... N92-12054 #

PNL-7369 ..... N92-12344 #
PNL-7793 ..... N92-12338 #
PNL-7794 ..... N92-12337 #

PREPRINT-1353 ..... N92-12217 #
PREPRINT-1359 ..... N92-12218 #
PREPRINT-1365 ..... N92-12219 #

RAE-TM-FS-1009 ..... N92-12004 #

RC-90-08 ..... N92-11978 #

REPT-NT-24192/AQEN ..... N92-12308 #

REPT-9/CEV/SE/LAMAS ..... N92-12420 #
REPT-38/CEV/SE/LAMAS ..... N92-12419 #
REPT-90-007 ..... N92-12787
REPT-90-013 ..... N92-12768
REPT-90-014 ..... N92-12571
REPT-90-014 ..... N92-12775
REPT-90-015 ..... N92-12572
REPT-90-015 ..... N92-12776
REPT-90-016 ..... N92-12573
REPT-90-016 ..... N92-12777
REPT-90-019 ..... N92-12586
REPT-90-020 ..... N92-12574
REPT-90-021 ..... N92-12575
REPT-90-022 ..... N92-12511
REPT-90-043 ..... N92-12550
REPT-90-045 ..... N92-12187
REPT-90-051 ..... N92-12188
REPT-90-062 ..... N92-12551
REPT-90-068 ..... N92-12552
REPT-90-069 ..... N92-12488
REPT-90/30 ..... N92-12006 #

REPT-90/55 ..... N92-12216 #
REPT-90/59 ..... N92-11982 #
REPT-91-002 ..... N92-12553
REPT-91B00149 ..... N92-12425* #
REPT-91E01722 ..... N92-12185* #
REPT-911-430-131 ..... N92-12064 #
REPT-911-430-133 ..... N92-12145 #
REPT-911-430-134 ..... N92-12146 #
REPT-911-430-135 ..... N92-12755 #
REPT-911-430-136 ..... N92-12065 #
REPT-911-430-137 ..... N92-12066 #
REPT-911-430-138 ..... N92-12067 #
REPT-911-440-110 ..... N92-12240 #
REPT-911-440-111 ..... N92-12255 #
REPT-911-440-112 ..... N92-12256 #
REPT-911-440-113 ..... N92-12322 #
REPT-911-440-114 ..... N92-12778 #
REPT-911-440-115 ..... N92-12681 #
REPT-911-550-101 ..... N92-12311 #
REPT-989B00173 ..... N92-12321* #

RFP-4498 ..... N92-12110 #

RIACS-TR-89-29 ..... N92-12436* #
RIACS-TR-89-31 ..... N92-12033* #
RIACS-TR-89-59 ..... N92-12496* #
RIACS-TR-90-18 ..... N92-12437* #

RU-89-32 ..... N92-12593 #

R91-900065-F ..... N92-12273* #

SAND-89-0634 ..... N92-12661 #
SAND-89-0947 ..... N92-12161 #
SAND-89-1380C ..... N92-12339 #
SAND-89-1748 ..... N92-12170 #
SAND-89-2845C ..... N92-12702 #
SAND-89-3103 ..... N92-12143 #
SAND-89-3137C ..... N92-12167 #
SAND-89-7064 ..... N92-11966 #
SAND-90-0048 ..... N92-12227 #
SAND-90-0061C ..... N92-12163 #
SAND-90-0201C ..... N92-12165 #
SAND-90-0236C ..... N92-12267 #
SAND-90-0419C ..... N92-12164 #
SAND-90-0537C ..... N92-12340 #
SAND-90-0599C ..... N92-12135 #
SAND-90-0600C ..... N92-12136 #
SAND-90-0632C ..... N92-12072 #
SAND-90-0646C ..... N92-12160 #
SAND-90-0983C ..... N92-12228 #
SAND-90-1049C ..... N92-12074 #
SAND-90-1078C ..... N92-12119 #
SAND-90-1236C ..... N92-12324 #
SAND-90-1249 ..... N92-12445 #
SAND-90-1272C ..... N92-12264 #
SAND-90-1292C ..... N92-12266 #
SAND-90-1573C ..... N92-12749 #
SAND-90-1670C ..... N92-12747 #
SAND-90-1906 ..... N92-12148 #
SAND-90-3101C ..... N92-12190 #
SAND-91-0364C ..... N92-12281 #
SAND-91-1004 ..... N92-12492 #
SAND-91-1037 ..... N92-12191 #
SAND-91-1509C ..... N92-12111 #
SAND-91-1551C ..... N92-12683 #
SAND-91-1726C ..... N92-12189 #
SAND-91-1847C ..... N92-12089 #
SAND-91-1861C ..... N92-12757 #
SAND-91-1865 ..... N92-12243 #
SAND-91-1992C ..... N92-12137 #
SAND-91-2014C ..... N92-12759 #
SAND-91-2046C ..... N92-12602 #
SAND-91-2047C ..... N92-12685 #
SAND-91-2113C ..... N92-12294 #
SAND-91-2115C ..... N92-12514 #
SAND-91-2116C ..... N92-12513 #
SAND-91-2850C ..... N92-12257 #

SC-MAG-336 ..... N92-12670 #
SC-MAG-337 ..... N92-12669 #

SERI/TP-214-4405 ..... N92-12335 #
SERI/TP-257-4123 ..... N92-12037 #

SESSIA-430/91-940 ..... N92-11979 #

SGD-561-PT-1 ..... N92-12980 #
SGD-561-PT-2 ..... N92-12981 #

SIP-0038 ..... N92-12725 #

SLAC-PUB-5619 ..... N92-12643 #

SMC-0043 ..... N92-12094 #

SPI-0036 ..... N92-12724 #

SRO-819-20-VOL-1 ..... N92-12341 #

SRS/STG-TR90-63 ..... N92-12447* #

SSC-23 ..... N92-12611 #

SSCL-507 ..... N92-12668 #

SU-CMR-91-4 ..... N92-12141* #

SU-SLAC-PUB-5085 ..... N92-12555 #
SU-SLAC-PUB-5219 ..... N92-12607 #
SU-SLAC-PUB-5231 ..... N92-12662 #

SU-SOL-91-10 ..... N92-12472 #

TELECOM-PARIS-90-E-018 ..... N92-12613 #
TELECOM-PARIS-90-E-020 ..... N92-12152 #
TELECOM-PARIS-90-E-021 ..... N92-12489 #
TELECOM-PARIS-90-E-022 ..... N92-12406 #
TELECOM-PARIS-91-C-003 ..... N92-12473 #
TELECOM-PARIS-91-C-004 ..... N92-12405 #
TELECOM-PARIS-91-E-001 ..... N92-12474 #

TR-5-32156 ..... N92-12360* #

TRI-PP-90-8 ..... N92-12248 #

UAH-TR-5-32586/5-32588 ..... N92-12362* #

UCID-21632 ..... N92-12150 #

UCLA/PPG-1200-VOL-3 ..... N92-12727 #

UCRL-CR-103896 ..... N92-12696 #
UCRL-CR-107134 ..... N92-12684 #

UCRL-ID-103852 ..... N92-12516 #
UCRL-ID-104103 ..... N92-12690 #
UCRL-ID-106094 ..... N92-12710 #
UCRL-ID-107225 ..... N92-12687 #
UCRL-ID-107566 ..... N92-12441 #
UCRL-ID-108258 ..... N92-12116 #

UCRL-JC-103311-REV-1 ..... N92-12694 #
UCRL-JC-103314-REV-1 ..... N92-12695 #
UCRL-JC-103855 ..... N92-12434 #
UCRL-JC-103890 ..... N92-12095 #
UCRL-JC-104039 ..... N92-12343 #
UCRL-JC-105761 ..... N92-12666 #
UCRL-JC-107839 ..... N92-12113 #
UCRL-JC-108046 ..... N92-12975 #

UCRL-TT-107146 ..... N92-12275 #

UCRL-21217 ..... N92-12258 #
UCRL-101431 ..... N92-12703 #
UCRL-101639 ..... N92-12038 #
UCRL-101641 ..... N92-12672 #
UCRL-101643 ..... N92-12674 #
UCRL-102094 ..... N92-12671 #
UCRL-102516 ..... N92-12172 #
UCRL-102750 ..... N92-12229 #
UCRL-102751 ..... N92-12230 #

UDC-551.553.8 ..... N92-12374
UDC-621.382.049.77:681.306(043 ..... N92-12175 #

UFIFT-HEP-90-14 ..... N92-12359 #

US-PATENT-APPL-SN-336452 ..... N92-12232
US-PATENT-APPL-SN-371884 ..... N92-12677
US-PATENT-APPL-SN-436839 ..... N92-12250
US-PATENT-APPL-SN-589142 ..... N92-12251
US-PATENT-APPL-SN-653578 ..... N92-12438* #
US-PATENT-APPL-SN-717755 ..... N92-12302* #
US-PATENT-APPL-SN-736667 ..... N92-12121* #
US-PATENT-APPL-SN-746581 ..... N92-12079* #
US-PATENT-APPL-SN-773376 ..... N92-12174* #

US-PATENT-CLASS-250-208.1 ..... N92-12677
US-PATENT-CLASS-367-6 ..... N92-12232
US-PATENT-CLASS-372-76 ..... N92-12250
US-PATENT-CLASS-372-95 ..... N92-12251

US-PATENT-4,939,744 ..... N92-12250
US-PATENT-4,962,303 ..... N92-12677
US-PATENT-5,008,860 ..... N92-12232
US-PATENT-5,012,483 ..... N92-12251

USGS-OFR-90-37 ..... N92-12323 #

UTIAS-50 ..... N92-11974 #
UTIAS-338 ..... N92-11996 #
UTIAS-339 ..... N92-12373 #
UTIAS-341 ..... N92-12042 #

UTK-91/09 ..... N92-12580 #

UTPT-91/23 ..... N92-12580 #

WHC-SA-1289 ..... N92-12220 #

XNIF-0001 ..... N92-12634 #

Y/TR-9: /35 ..... N92-12209 #

YCTP-P-13-89 ..... N92-12593 #

Appendix

NASA SCIENTIFIC AND TECHNICAL INFORMATION PROGRAM PRODUCTS AND SERVICES

The NASA Scientific and Technical Information (STI) Program provides for the collection and announcement of aerospace-related reports and literature obtained worldwide through agreements and exchanges. The result of the collection is the comprehensive NASA STI Database that covers aeronautics, space, and supporting disciplines.

The STI Database, documents generated or obtained by NASA, and products and services derived from or supporting the database are made available to the NASA research community and to the public. Descriptions and sources of these items are presented in the following pages.

Scientific and Technical Aerospace Reports (*STAR*) is an abstract journal, listing citations with abstracts for aerospace-related reports obtained from worldwide sources. *STAR* is issued on the 8th and 23rd of each month and announces current documents that have been entered into the NASA STI Database during the previous two weeks. The reports are of the following types:

- NASA, NASA contractor, and NASA grantee reports;
- Reports issued by other U.S. Government agencies, domestic and foreign institutions, universities, and private firms;
- Translations in report form;
- NASA-owned patents and patent applications;
- Other U.S. Government agency and foreign patents and patent applications;
- Domestic and foreign dissertations and theses.

Journal, book, and conference literature, journal translations, and certain foreign dissertations having the same subject scope as *STAR* are announced in a companion journal, *International Aerospace Abstracts* (*IAA*). *IAA* is issued on the 1st and 15th of each month and is available from the American Institute of Aeronautics and Astronautics, Technical Information Service, 555 West 57th Street, 12th Floor, New York, NY 10019.

ELIGIBILITY AND REGISTRATION FOR NASA STI PRODUCTS AND SERVICES

Organizations of the type listed below that have registered with NASA can receive products and services.

- NASA offices and installations, contractors, subcontractors, grantees, and consultants;
- Other U.S. Government agencies and their contractors;
- Libraries in the United States that have arrangements with NASA to maintain collections of NASA documents for public reference;
- Other organizations in the United States having a need for NASA documents in work related to aeronautics and space research;
- Organizations abroad that have established reciprocal documents exchange arrangements with NASA.

Only the central service points or central points of document acquisition and control within qualified organizations are eligible to register for NASA STI products and services. Domestic organizations that may be eligible to receive various classes of NASA publications and services should address their requests for registration or further information to:

NASA Center for AeroSpace Information
ATTN: Registration Services
P.O. Box 8757
Baltimore, MD 21240-0757
301-621-0153

Organizations abroad should direct requests to:

National Aeronautics and Space Administration
Director, Scientific and Technical Information Program
Code JTT
Washington, DC 20546
USA
703-271-5640

SUBJECT SCOPE

The subject scope of *STAR* and *IAA* includes all aspects of aeronautics and space research and development, supporting basic and applied research, and applications. Aerospace aspects of Earth resources, energy development, conservation, oceanography, environmental protection, urban transportation, and other topics of high national priority are also covered.

HOW TO USE *STAR* SUBJECT CATEGORIES

Abstracts in *STAR* are categorized by 10 major subject divisions that are divided further into 76 specific subject categories. The subject divisions and categories are listed in the Table of Contents together with a note for each that defines its scope and provides any cross-references. For example:

16 SPACE TRANSPORTATION
Includes passenger and cargo space transportation, e.g., shuttle operations; and space rescue techniques. For related information see also *03 Air Transportation and Safety* and *18 Spacecraft Design, Testing and Performance.* For space suits see *54 Man/System Technology and Life Support.*

CROSS-REFERENCES

Individual *STAR* abstracts are not ordinarily cross-referenced, except for certain conference reports or book translations that have had separate abstracts written for their component papers or chapters. Citations and abstracts of the components follow immediately after those of the parent document. When the subject content of a component differs sufficiently from the general content of the parent, a cross-reference citation also is printed at the end of the category to which it normally would have been assigned if it were independent.

DOCUMENTS ON MICROFICHE

Documents available on microfiche are designated by a pound sign (#) following the accession number.

LIMITED REPRODUCIBILITY

A note of limited reproducibility appears in the citation, if there are factors affecting the reproducibility of more than 20% of the document. These factors include faint or broken type, color photographs, black and white photographs, foldouts, dot matrix print, or some other factor that limits the reproducibility of the document. This notation also appears on the microfiche header with the specific factor checked off on a list visible in the second frame.

COLOR COPIES

An increasing number of NASA scientific and technical reports are being produced with color graphs, charts, illustrations, and photographs. An indication that a document has color pages follows the source and pricing (SAP) information in the *STAR* citation.

Registered users of the NASA Scientific and Technical Information Program will receive ordered documents with color at no additional cost, as long as stock copies of the document are available. Otherwise, an additional fee of $2.00 per color page will be charged. The NASA Center for AeroSpace Information staff will contact registered users to determine individual user's needs.

NASA PATENTS AND PATENT APPLICATIONS

Patents and patent applications owned by NASA are announced in *STAR* under appropriate subject categories and are referenced in the *STAR* indexes. In the Report/Accession Number Index, patents are indexed by the NASA Case Number, and the U.S. Patent Class. Patent applications are indexed by the NASA Case Number and the U.S. Patent Application Serial Number.

Printed copies of patents (which are not microfiched) are available for purchase from the U.S. Patent and Trademark Office.

NASA patent application specifications are sold in both paper copy and microfiche by the National Technical Information Service (NTIS). The US-Patent-Appl-SN-number should be used in ordering either paper copy or microfiche from NTIS.

When ordering patents, the U.S. Patent Number should be used, and payment must be remitted in advance, by money order or check payable to the Commissioner of Patents and Trademarks. Prepaid purchase coupons for ordering are also available from the U.S. Patent and Trademark Office.

The patents and patent applications announced in *STAR* are owned by NASA and are available for royalty-free licensing. Requests for licensing terms and further information should be addressed to:

National Aeronautics and Space Administration
Associate General Counsel for Intellectual Property
Code GP
Washington, DC 20546

SOURCES FOR DOCUMENTS

One or more sources from which a document announced in *STAR* is available to the public is given in each citation. The most commonly indicated sources and their acronyms or abbreviations are listed on page A-6. If the publication is available from a source other than those listed, the publisher and address will be displayed on the availability line or in combination with the corporate source line.

Avail: NTIS. Sold by the National Technical Information Service. Prices for hard copy (HC) and microfiche (MF) are indicated by a price code following the letters HC or MF in the *STAR* citation. Current values for the price codes are given in the tables on page A-7.

Initially distributed microfiche under the NTIS SRIM (Selected Research in Microfiche) is available at greatly reduced unit prices. For this service and for information concerning subscription to NASA printed reports, consult the NTIS Subscription Section, Springfield, VA 22161.

NOTE ON ORDERING DOCUMENTS: When ordering NASA publications (those followed by the * symbol), use the N accession number. NASA patent applications (only the specifications are offered) should be ordered by the US-Patent-Appl-SN number. Non-NASA publications (no asterisk) should be ordered by the AD, PB, or other *report number* shown on the last line of the citation, not by the N accession number. It is also advisable to cite the title and other bibliographic identification.

Avail: SOD (or GPO). Sold by the Superintendent of Documents, U.S. Government Printing Office, in hard copy. The current price and order number are given following the availability line. (NTIS will fill microfiche requests, as indicated above, for those documents identified by a # symbol.)

Avail: BLL (formerly NLL): British Library Lending Division, Boston Spa, Wetherby, Yorkshire, England. Photocopies available from this organization at the price shown. (If none is given, address inquiry to the BLL.)

Avail: DOE Depository Libraries. Organizations in U.S. cities and abroad that maintain collections of Department of Energy reports, usually in microfiche form, are listed in *Energy Research Abstracts.* Services available from the DOE and its depositories are described in a booklet, *DOE Technical Information Center - Its Functions and Services* (TID-4660), which may be obtained without charge from the DOE Technical Information Center.

Avail: ESDU. Pricing information on specific data, computer programs, and details on Engineering Sciences Data Unit (ESDU) topic categories can be obtained from ESDU International Ltd. Requesters in North America should use the Virginia address while all other requesters should use the London address, both of which are on page A-6.

Avail: Fachinformationszentrum, Karlsruhe. Sold by the Fachinformationszentrum Energie, Physik, Mathematik GMBH, Eggenstein Leopoldshafen, Federal Republic of Germany, at the price shown in deutschmarks (DM).

Avail: HMSO. Publications of Her Majesty's Stationery Office are sold in the U.S. by Pendragon House, Inc. (PHI), Redwood City, CA. The U.S. price (including a service and mailing charge) is given, or a conversion table may be obtained from PHI.

Avail: NASA Public Document Rooms. Documents so indicated may be examined at or purchased from the National Aeronautics and Space Administration, Public Documents Room (Room 126), 600 Independence Ave., S.W., Washington, DC 20546, or public document rooms located at NASA installations, and the NASA Pasadena Office at the Jet Propulsion Laboratory.

Avail: Univ. Microfilms. Documents so indicated are dissertations selected from *Dissertation Abstracts* and are sold by University Microfilms as xerographic copy (HC) and microfilm. All requests should cite the author and the Order Number as they appear in the citation.

Avail: US Patent and Trademark Office. Sold by Commissioner of Patents and Trademarks, U.S. Patent and Trademark Office, at the standard price of $1.50 each, postage free. (See discussion of NASA patents and patent applications below.)

Avail: (US Sales Only). These foreign documents are available to users within the United States from the National Technical Information Service (NTIS). They are available to users outside the United States through the International Nuclear Information Service (INIS) representative in their country, or by applying directly to the issuing organization.

Avail: USGS. Originals of many reports from the U.S. Geological Survey, which may contain color illustrations, or otherwise may not have the quality of illustrations preserved in the microfiche or facsimile reproduction, may be examined by the public at the libraries of the USGS field offices whose addresses are listed on page A-6. The libraries may be queried concerning the availability of specific documents and the possible utilization of local copying services, such as color reproduction.

Avail: Issuing Activity, or Corporate Author, or no indication of availability. Inquiries as to the availability of these documents should be addressed to the organization shown in the citation as the corporate author of the document.

FEDERAL DEPOSITORY LIBRARIES: To provide the general public with greater access to U.S. Government publications, Congress established the Federal Depository Library Program under the Government Printing Office (GPO), with 52 regional depositories responsible for permanent retention of material, inter-library loan, and reference services. (These libraries are not sales outlets.) At least one copy of nearly every NASA and NASA-sponsored publication, either in printed or microfiche format, is received and retained by the 52 regional depositories. A list of the regional GPO libraries, appears on page A-8. A local library can contact a regional depository library to help locate specific reports, or direct contact may be made by an individual.

PUBLIC COLLECTION OF NASA DOCUMENTS

An extensive collection of NASA and NASA-sponsored publications is maintianed by the British Library Lending Divison, Boston Spa, Wetherby, Yorkshire, England, for public access. The British Library Lending Division also has available many of the non-NASA publications cited in *STAR*.

European requesters may purchase facsimile copy or microfiche of NASA and NASA-sponsored documents, those identified by both the symbols # and * from ESA—Information Retrieval Service, European Space Agency, 8-10 rue Mario-Nikis, 75738 Paris CEDEX 15, France.

SUBMITTING DOCUMENTS

All users of this abstract service are urged to forward reports to be considered for announcement in *STAR*. This will aid NASA in its efforts to provide the fullest possible coverage of all scientific and technical publications that might support aeronautics and space research and development. If you have prepared relevant reports (other than those you will transmit to NASA, DOD, or DOE through the usual contract- or grant-reporting channels), please send them for consideration to the NASA Center for AeroSpace Information, P.O. Box 8757, Baltimore, MD 21240-0757.

Reprints of journal articles, book chapters, and conference papers are also welcome. These will be considered for announcement in *STAR*'s companion journal, *IAA*.

You may specify a particular source to be included in a report announcement if you wish; otherwise the report will be placed on a public sale at the National Technical Information Service. Copyrighted publications will be announced but not distributed or sold.

PURCHASE OF *STAR*

STAR is publicly available on annual subscription from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

STAR is available to registered users on annual subscription from the NASA Center for AeroSpace Information, ATTN: Registration Services, P.O. Box 8757, Baltimore, MD 21240-0757.

Microfiche of the abstract sections of *STAR* are available, on annual subscription only, from NTIS as PB92-911300, Attn: Subscriptions, 5285 Port Royal Road, Springfield, VA 22161. Annual subscription rates are $100.00 North America; $200.00 foreign. Abstract sections for previous years retroactive to 1964 are available at the current rates.

ADDRESSES OF ORGANIZATIONS

American Institute of Aeronautics and Astronautics
Technical Information Service
555 West 57th Street, 12th Floor
New York, New York 10019

British Library Lending Division,
Boston Spa, Wetherby, Yorkshire,
England

Commissioner of Patents and Trademarks
U.S. Patent and Trademark Office
Washington, DC 20231

Department of Energy
Technical Information Center
P.O. Box 62
Oak Ridge, Tennessee 37830

European Space Agency-Information Retrieval Service
ESRIN
Via Galileo Galilei
00044 Frascati (Rome) Italy

Engineering Sciences Data Unit International
P.O. Box 1633
Manassas, Virginia 22110

Engineering Sciences Data Unit International, Ltd.
251-259 Regent Street
London, W1R 7AD, England

Fachinformationszentrum Energie, Physik, Mathematik
GMBH
7514 Eggenstein Leopoldshafen
Federal Republic of Germany

Her Majesty's Stationery Office
P.O. Box 569, S.E. 1
London, England

NASA Center for AeroSpace Information
P.O. Box 8757
Baltimore, Maryland 21240-0757

National Aeronautics and Space Administration
Scientific and Technical Information Program (JTT)
Washington, DC 20546

National Technical Information Service
5285 Port Royal Road
Springfield, Virginia 22161

Pendragon House, Inc.
899 Broadway Avenue
Redwood City, California 94063

Superintendent of Documents
U.S. Government Printing Office
Washington, DC 20402

University Microfilms
A Xerox Company
300 North Zeeb Road
Ann Arbor, Michigan 48106

University Microfilms, Ltd.
Tylers Green
London, England

U.S. Geological Survey Library National Center
MS 950
12201 Sunrise Valley Drive
Reston, Virginia 22092

U.S. Geological Survey Library
2255 North Gemini Drive
Flagstaff, Arizona 86001

U.S. Geological Survey
345 Middlefield Road
Menlo Park, California 94025

U.S. Geological Survey Library
Box 25046
Denver Federal Center, MS914
Denver, Colorado 80225

NTIS PRICE SCHEDULES

(Effective October 1, 1991)

Schedule A
STANDARD PRICE DOCUMENTS AND MICROFICHE**

PRICE CODE	NORTH AMERICAN PRICE	FOREIGN PRICE
A01	$ 9.00	$ 18.00
A02	12.50	25.00
A03	17.00	34.00
A04-A05	19.00	38.00
A06-A09	26.00	52.00
A10-A13	35.00	70.00
A14-A17	43.00	86.00
A18-A21	50.00	100.00
A22-A25	59.00	118.00
A99	*	*
N01	60.00	120.00
N02	59.00	118.00
N03	20.00	40.00

Schedule E
EXCEPTION PRICE DOCUMENTS AND MICROFICHE**

PRICE CODE	NORTH AMERICAN PRICE	FOREIGN PRICE
E01	$11.00	$ 22.00
E02	14.00	28.00
E03	16.00	32.00
E04	19.00	38.00
E05	21.00	42.00
E06	24.00	48.00
E07	27.00	54.00
E08	30.00	60.00
E09	33.00	66.00
E10	36.00	72.00
E11	39.00	78.00
E12	43.00	86.00
E13	46.00	92.00
E14	50.00	100.00
E15	54.00	108.00
E16	59.00	118.00
E17	64.00	128.00
E18	69.00	138.00
E19	76.00	152.00
E20	88.00	176.00
E99	*	*

* Contact NTIS for price quote.

** Effective January 1, 1991, the microfiche copy of any new document entering the NTIS collection will be priced the same as the paper copy of the document.

IMPORTANT NOTICE

NTIS Shipping and Handling Charges

U.S., Canada, Mexico — ADD $3.00 per TOTAL ORDER

All Other Countries — ADD $4.00 per TOTAL ORDER

Exceptions — Does NOT apply to:

ORDERS REQUESTING NTIS RUSH HANDLING
ORDERS FOR SUBSCRIPTION OR STANDING ORDER PRODUCTS *ONLY*

NOTE: Each additional delivery address on an order requires a separate shipping and handling charge.

FEDERAL REGIONAL DEPOSITORY LIBRARIES

ALABAMA

AUBURN UNIV. AT MONTGOMERY LIBRARY
Documents Dept.
7300 University Drive
Montgomery, AL 36117-3596
(205) 244-3650 FAX: (205) 244-0678

UNIV. OF ALABAMA
Amelia Gayle Gorgas Library
Govt. Documents
Box 870266
Tuscaloosa, AL 35487-0266
(205) 348-6046 FAX: (205) 348-8833

ARIZONA

DEPT. OF LIBRARY, ARCHIVES, AND PUBLIC RECORDS
Federal Documents
Third Floor State Capitol
1700 West Washington
Phoenix, AZ 85007
(602) 542-4121 FAX: (602) 542-4400; 542-4500

ARKANSAS

ARKANSAS STATE LIBRARY
State Library Services
One Capitol Mall
Little Rock, AR 72201
(501) 682-2869

CALIFORNIA

CALIFORNIA STATE LIBRARY
Govt. Publications Section
914 Capitol Mall - P.O. Box 942837
Sacramento, CA 94237-0001
(916) 322-4572 FAX: (916) 324-8120

COLORADO

UNIV. OF COLORADO - BOULDER
Norlin Library
Govt. Publications
Campus Box 184
Boulder, CO 80309-0184
(303) 492-8834 FAX: (303) 492-2185

DENVER PUBLIC LIBRARY
Govt. Publications Dept. BS/GPD
1357 Broadway
Denver, CO 80203
(303) 571-2135

CONNECTICUT

CONNECTICUT STATE LIBRARY
231 Capitol Avenue
Hartford, CT 06106
(203) 566-4971 FAX: (203) 566-3322

FLORIDA

UNIV. OF FLORIDA LIBRARIES
Documents Dept.
Library West
Gainesville, FL 32611-2048
(904) 392-0366 FAX: (904) 392-7251

GEORGIA

UNIV. OF GEORGIA LIBRARIES
Govt. Documents Dept.
Jackson Street
Athens, GA 30602
(404) 542-8949 FAX: (404) 542-6522

HAWAII

UNIV. OF HAWAII
Hamilton Library
Govt. Documents Collection
2550 The Mall
Honolulu, HI 96822
(808) 948-8230 FAX: (808) 956-5968

IDAHO

UNIV. OF IDAHO LIBRARY
Documents Section
Moscow, ID 83843
(208) 885-6344 FAX: (208) 885-6817

ILLINOIS

ILLINOIS STATE LIBRARY
Reference Dept.
300 South Second
Springfield, IL 62701-1796
(217) 782-7596 FAX: (217) 524-0041

INDIANA

INDIANA STATE LIBRARY
Serials/Documents Section
140 North Senate Avenue
Indianapolis, IN 46204
(317) 232-3678 FAX: (317) 232-3728

IOWA

UNIV. OF IOWA LIBRARIES
Govt. Publications Dept.
Washington & Madison Streets
Iowa City, IA 52242
(319) 335-5926 FAX: (319) 335-5830

KANSAS

UNIV. OF KANSAS
Govt. Documents & Map Library
6001 Malatt Hall
Lawrence, KS 66045-2800
(913) 864-4660 FAX: (913) 864-5380

KENTUCKY

UNIV. OF KENTUCKY LIBRARIES
Govt. Publications/Maps Dept.
Lexington, KY 40506-0039
(606) 257-3139 FAX: (606) 257-1563; 257-8379

LOUISIANA

LOUISIANA STATE UNIV.
Middleton Library
Govt. Documents Dept.
Baton Rouge, LA 70803
(504) 388-2570 FAX: (504) 388-6992

LOUISIANA TECHNICAL UNIV.
Prescott Memorial Library
Govt. Documents Dept.
305 Wisteria Street
Ruston, LA 71270-9985
(318) 257-4962 FAX: (318) 257-2447

MAINE

TRI-STATE DOCUMENTS DEPOSITORY
Raymond H. Fogler Library
Govt. Documents & Microforms Dept.
Univ. of Maine
Orono, ME 04469
(207) 581-1680

MARYLAND

UNIV. OF MARYLAND
Hornbake Library
Govt. Documents/Maps Unit
College Park, MD 20742
(301) 454-3034 FAX: (301) 454-4985

MASSACHUSETTS

BOSTON PUBLIC LIBRARY
Govt. Documents Dept.
666 Boylston Street
Boston, MA 02117
(617) 536-5400 ext. 226
FAX: (617) 267-8273; 267-8248

MICHIGAN

DETROIT PUBLIC LIBRARY
5201 Woodward Avenue
Detroit, MI 48202-4093
(313) 833-1440; 833-1409
FAX: (313) 833-5039

LIBRARY OF MICHIGAN
Govt. Documents Unit
P.O. Box 30007
Lansing, MI 48909
(517) 373-0640 FAX: (517) 373-3381

MINNESOTA

UNIV. OF MINNESOTA
Wilson Library
Govt. Publications Library
309 19th Avenue South
Minneapolis, MN 55455
(612) 624-5073 FAX: (612) 626-9353

MISSISSIPPI

UNIV. OF MISSISSIPPI
J.D. Williams Library
Federal Documents Dept.
106 Old Gym Bldg.
University, MS 38677
(601) 232-5857 FAX: (601) 232-5453

MISSOURI

UNIV. OF MISSOURI - COLUMBIA
Ellis Library
Govt. Documents
Columbia, MO 65201
(314) 882-6733 FAX: (314) 882-8044

MONTANA

UNIV. OF MONTANA
Maureen & Mike Mansfield Library
Documents Div.
Missoula, MT 59812-1195
(406) 243-6700 FAX: (406) 243-2060

NEBRASKA

UNIV. OF NEBRASKA - LINCOLN
D.L. Love Memorial Library
Documents Dept.
Lincoln, NE 68588
(402) 472-2562

NEVADA

UNIV. OF NEVADA
Reno Library
Govt. Publications Dept.
Reno, NV 89557
(702) 784-6579 FAX: (702) 784-1751

NEW JERSEY

NEWARK PUBLIC LIBRARY
U.S. Documents Div.
5 Washington Street - P.O. Box 630
Newark, NJ 07101-0630
(201) 733-7812 FAX: (201) 733-5648

NEW MEXICO

UNIV. OF NEW MEXICO
General Library
Govt. Publications Dept.
Albuquerque, NM 87131-1466
(505) 277-5441 FAX: (505) 277-6019

NEW MEXICO STATE LIBRARY
325 Don Gaspar Avenue
Santa Fe, NM 87503
(505) 827-3826 FAX: (505) 827-3820

NEW YORK

NEW YORK STATE LIBRARY
Documents/Gift & Exchange Section
Federal Depository Program
Cultural Education Center
Albany, NY 12230
(518) 474-5563 FAX: (518) 474-5786

NORTH CAROLINA

UNIV. OF NORTH CAROLINA - CHAPEL HILL
CB#3912, Davis Library
BA/SS Dept.—Documents
Chapel Hill, NC 27599
(919) 962-1151 FAX: (919) 962-0484

NORTH DAKOTA

NORTH DAKOTA STATE UNIV. LIBRARY
Documents Office
Fargo, ND 58105
(701) 237-8886 FAX: (701) 237-7138
In cooperation with Univ. of North Dakota, Chester Fritz Library
Grand Forks

OHIO

STATE LIBRARY OF OHIO
Documents Dept.
65 South Front Street
Columbus, OH 43266
(614) 644-7051 FAX: (614) 752-9178

OKLAHOMA

OKLAHOMA DEPT. OF LIBRARIES
U.S. Govt. Information Div.
200 NE 18th Street
Oklahoma City, OK 73105-3298
(405) 521-2502, ext. 252, 253
FAX: (405) 525-7804

OKLAHOMA STATE UNIV.
Edmon Low Library
Documents Dept.
Stillwater, OK 74078
(405) 744-6546 FAX: (405) 744-5183

OREGON

PORTLAND STATE UNIV.
Millar Library
934 SW Harrison - P.O. Box 1151
Portland, OR 97207
(503) 725-3673 FAX: (503) 725-4527

PENNSYLVANIA

STATE LIBRARY OF PENN.
Govt. Publications Section
Walnut St. & Commonwealth Ave. - P.O. Box 1601
Harrisburg, PA 17105
(717) 787-3752

SOUTH CAROLINA

CLEMSON UNIV.
Cooper Library
Public Documents Unit
Clemson, SC 29634-3001
(803) 656-5174 FAX: (803) 656-3025
In cooperation with Univ. of South Carolina, Thomas Cooper Library, Columbia

TENNESSEE

MEMPHIS STATE UNIV. LIBRARIES
Govt. Documents
Memphis, TN 38152
(901) 678-2586 FAX: (901) 678-2511

TEXAS

TEXAS STATE LIBRARY
United States Documents
P.O. Box 12927 - 1201 Brazos
Austin, TX 78711
(512) 463-5455 FAX: (512) 463-5436

TEXAS TECH. UNIV. LIBRARY
Documents Dept.
Lubbock, TX 79409
(806) 742-2268 FAX: (806) 742-1920

UTAH

UTAH STATE UNIV.
Merrill Library & Learning Resources Center, UMC-3000
Documents Dept.
Logan, UT 84322-3000
(801) 750-2684 FAX: (801) 750-2677

VIRGINIA

UNIV. OF VIRGINIA
Alderman Library
Govt. Documents
Charlottesville, VA 22903-2498
(804) 924-3133 FAX: (804) 924-4337

WASHINGTON

WASHINGTON STATE LIBRARY
Document Section
MS AJ-11
Olympia, WA 98504-0111
(206) 753-4027 FAX: (206) 753-3546

WEST VIRGINIA

WEST VIRGINIA UNIV. LIBRARY
Govt. Documents Section
P.O. Box 6069
Morgantown, WV 26506
(304) 293-3640

WISCONSIN

ST. HIST. SOC. OF WISCONSIN LIBRARY
Govt. Publications Section
816 State Street
Madison, WI 53706
(608) 262-2781 FAX: (608) 262-4711
In cooperation with Univ. of Wisconsin-Madison, Memorial Library

MILWAUKEE PUBLIC LIBRARY
Documents Div.
814 West Wisconsin Avenue
Milwaukee, WI 53233
(414) 278-2167 FAX: (414) 278-2137

WYOMING

WYOMING STATE LIBRARY
Supreme Court & Library Bldg.
Govt. Publications
Cheyenne, WY 82002
(307) 777-5920 FAX: (307) 777-6289

* U.S. G.P.O.:1992-313-125:60003

National Aeronautics and
Space Administration
Code JTT
Washington, D.C.
20546-0001

Official Business
Penalty for Private Use, $300

SPECIAL FOURTH-CLASS RATE
POSTAGE & FEES PAID
NASA
PERMIT No. G27

NASA

POSTMASTER: If Undeliverable (Section 158
Postal Manual) Do Not Return